

DUWC Project Studies Carbon Cycling in Peatlands

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—Curtis J. Richardson

Curtis J. Richardson, director of the Duke University Wetland Center, has received a \$995,000 grant from the U.S. Department of Energy's Office of Biological and Environmental Research (DOE-OBER) to study carbon cycling in peatlands.

Richardson is professor of resource ecology at Duke's Nicholas School of the Environment.

The new grant, awarded through DOE-OBER's Terrestrial Ecosystem Science Program, will support his study on phenolic compounds and black carbon feedback controls on peat decomposition and carbon accumulation in southeastern peat.

Peatland ecosystems are among Earth's most efficient carbon sinks. Globally, they are estimated to store more than 550 gigatons of carbon in their saturated soil, a value that approaches nearly one-third of earth's carbon stock. This carbon, captured from the atmosphere, can be stored in the saturated peat for millennia due to the presence of naturally occurring phenolic compounds which inhibit microbial decomposition.

In recent years, however, large areas of peat wetlands worldwide are being burned or drained for agriculture, forestry and to harvest the peat for energy. The organic carbon that is normally stored underwater is exposed to air, dries and decomposes, and emits carbon dioxide back into the atmosphere. Climate change is adding to the problem.

"The main question we are addressing is how southern peatlands continue to store carbon and release lower amounts of greenhouse gases compared to northern peatlands, even under climate-driven increases in temperature and extended droughts," Richardson says. "The research focuses on the role of phenolics and black carbon, both antibacterial carbon compounds, as biogeochemical controls on peat decomposition along a latitudinal gradient from Minnesota to Panama. What we learn will provide us with new approaches for managing storage and losses of carbon from millions of acres of peatlands worldwide."



Left. DUWC director Curtis Richardson and lab technician Jonathan Bills work in a study site at Pocosin Lakes National Wildlife Refuge in eastern North Carolina. Pocosins—nutrient-poor, freshwater, evergreen shrub bogs—occur in coastal areas of Virginia, North Carolina, and South Carolina. Over the past 4 millennia, such subtropical and tropical peatlands have accumulated and stored over 20% of the continental United States' peat. *Right.* Globally, accidental fires and commercial deforestation and burning account for significant releases of carbon into the atmosphere. The DUWC study will provide much needed information for management of hydrology and fire intensity in natural and degraded shrub/tree peatlands, central to maintaining peat/litter quality (phenol/black carbon) and enhancing long-term carbon accumulation.

Photos: DUWC & USFWS