

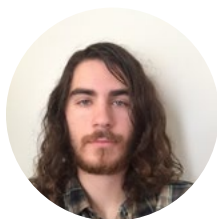
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# Rice Center focuses on restoring wetlands

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The center, designed and built with the environment in mind, is an ideal location to study the ecosystem where freshwater and saltwater meet

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Halfway between Richmond and Williamsburg, where Kimages Creek flows into the James River, lies the Inger and Walter Rice Center for Environmental Life Sciences. A restoration project aims to return the area to its original state as a wetland. The project began by removing a dam that had been blocking the flow of Kimages Creek since 1927.

Formerly a YMCA camp, the property was purchased in 1977 by Walter Rice, former U.S. ambassador to Australia, before being donated



The Walter L. Rice Education Building

The center is the perfect backdrop to study ‘one of most poorly understood interfaces between fresh and saltwater.’

to the university by his wife, Inger Rice, in 2000. The intent was for VCU to use the land to develop a center for education, outreach and research, which became informally known as the Rice Rivers Center.

The main building, the Walter L. Rice Education Building, is an exemplary model for sustainable construction and has the highest certification under the LEED (Leadership in Energy & Environmental Design) program. It was constructed with sustainably harvested Atlantic white cedar and tropical hardwood. The center’s gravel parking lot contains a plastic framework that drains rainwater into bioswales – mini habitats full of native wetland vegetation.

Other features include a “living roof” full of plants that utilize rainwater and insulate the building. Cisterns collect water for flushing the toilets. Thirty-six geothermal wells circulate water underground for energy efficient heating and cooling. It even contains insulation made from old blue jeans and a coat closet made of sunflower seeds and husks.

Positioning of the building lets it capture heat from the sun during the winter. “Light tubes” concentrate sunlight, negating the need for lightbulbs during the daytime. And of course, the center has installed several solar panels.

The center’s location along the James River estuary provides the perfect backdrop for researchers to study “one of most poorly understood interfaces between fresh and saltwater,” said Dr. Edward Crawford, head of the Wetlands Restoration Project.

Protecting wetland ecosystems is of vital importance. “A hectare of Atlantic Coast salt marsh can produce upwards of 80 tons of organic matter a year,” which provides food for

organisms further downstream, Crawford said. Wetland plants leach oxygen in a process called “radial oxygen loss,” which create “oxidized rhizospheres” that house millions of bacteria.

These bacteria break down and transform nutrients and toxins, like nitrogen. Crawford refers to wetlands as “nature’s supermarkets and kidneys” for their ability to produce organic matter and filter toxins and sediments.

That’s why, when he learned about VCU’s acquisition of the property, his first concern was tearing down the dam that had been blocking Kimages Creek since 1927, thereby restoring it to a wetland ecosystem. A storm breached the dam in 2006, and in 2010, approximately a third was removed.

Wetlands are extremely diverse and are an important part of many species’ life cycles. Nearly 50 percent of endangered species and 80 percent of breeding birds utilize wetlands at some point in their lives. Now that the connection to the James is restored, fish are free to swim up the creek and use it as spawning habitat.

“Every time I go up there, I see hundreds and hundreds of minnows swimming in and out of the restored wetland,” Crawford said.

Dr. Paul Bukaveckas, a professor of environmental studies and biology, conducted a study to measure retention of nitrogen in the restored creek. He found that compared with similar bodies of water nearby, Kimages Creek had attained normal levels of functioning.

Common sources of nitrogen include wastewater and agricultural run-off. It can cause a “range of problems including excessive algal growth, reduced water clarity and dissolved oxygen, and the occurrence of harmful algal blooms,”



A view of the restored Kimages Creek

If upstream ecosystems can be restored, Dr. Paul Bukaveckas says, 'This will reduce harmful impacts in downstream areas.'



Looking out from the Rice Center toward the James River

Bukaveckas said. “To the extent that upstream ecosystems can be restored to promote greater nitrogen retention, this will reduce harmful impacts in downstream areas.”

Dr. Scott Neubauer, an assistant professor in the Department of Biology, added that wetlands don’t suffer the same ill-effects of excess nutrients like nitrogen because “wetland soils typically have little to no oxygen.”

“There is an anaerobic (oxygenless) microbial process called denitrification that can convert inorganic nitrogen from the water column into the largely-inert nitrogen gas that already makes up almost 80 percent of the atmosphere,” Neubauer said.

Around the time the dam was built, King Fulton, the landowner at the time, clear-cut much of the land. One of the first studies conducted at the Rice Center was geo-referencing the location of all the stumps and determining what types of trees they were. The goal is to create a “virtual swamp” that will let Crawford and others create models of the environment while manipulating variables like temperature and precipitation, allowing them to see what it would have looked like without human intervention.

The Rice Center also has an eddy covariance flux tower – a sort of miniature meteorological station. It measures carbon dioxide, methane and water vapor exchange between the wetland and the atmosphere. “The hypothesis is that in these regenerating wetlands, more carbon is stored within the system than is getting emitted to the atmosphere,” Crawford said.

Exciting research is happening all the time at the center. Much of it is done by VCU staff and graduate students, but they also collaborate with researchers from the U.S. Fish and Wildlife

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Service, Virginia Department of Game and Inland Fisheries, and even NASA.

An open invitation exists for anyone interested in visiting. “I’d love for every student to have some type of experience at the Rice Rivers Center before they graduate,” Crawford said.

**Want to visit the Rice Center?**

Tours are open to the public every second Thursday of the month from 1 to 4 p.m. The center is located at 3701 John Tyler Memorial Highway in Charles City. For more information, visit [www.ricerivers.vcu.edu](http://www.ricerivers.vcu.edu). •