



Restoring our Rivers

By Bridget Avila

Maryland has the largest number of river restoration projects in the United States. Dr. Margaret Palmer has been a key leader in advancing the policies and practices of river restoration and conservation.

On a sweltering July afternoon, an assortment of men and women clad in T-shirts and river sandals climb out of their vehicles and walk down to a small stream that feeds into the South River. They are there at the Wilelinor restoration site to work and to learn, hands-on, how river restoration works.



Margaret Palmer, Director of the Chesapeake Biological Laboratory at the University of Maryland's Center for Environmental Science, stands on a berm watching the group move through four stations along the length of the stream. The group is fulfilling one of its fieldwork assignments as part of a weeklong course on river restoration principles. Students in the class include doctoral candidates, government employees, and interested citizens from around the country.

"This is the first time such a course has been offered on the East Coast," says Palmer. "We've had a great response after the two articles published this year."

The articles to which she refers are "Synthesizing U.S. River Restoration", published in *Science* and "Standard for Ecologically Successful River Restoration", published in the *Journal of Applied Ecology*. The articles, written in collaboration with a team of scientists, point out the great disparity between the large sums of money—mainly taxpayer dollars—going toward river restoration projects and the small number of such projects that are later assessed for how successful they were at reaching their intended goals and point out the lack of standards for setting such goals. Restoration projects may have had ecological goals (such as water quality or habitat improvement) or served the purpose of creating or protecting infrastructure.

Government officials, scientists, and nonprofit organizations are quickly responding. "The articles have been a wake-up call," says Palmer. "Already I've had invitations from around the country and the world to discuss our work." Such an immediate response is hardly surprising, considering that Palmer's team estimates that more than \$1 billion has been spent on river restoration activities in the continental United States since 1990. The scientists found that in Maryland, with the largest number of projects per 1000 km of streams and rivers, only 6.3 percent of these projects indicate any monitoring.



Palmer and Emily Bernhardt, her postdoctoral associate at the University of Maryland, led a team of scientists in a research endeavor called the National River Restoration Science Synthesis (NRRSS) project, the first-ever comprehensive database of more than 37,000 stream and restoration projects nationwide. The purpose of the project is to assemble a database of knowledge from scientists and environmental engineers "to provide a national level synthesis that can be used to inform policy at local, regional, and national levels." The project seeks to promote and advance river restoration and streamline its implementation through a partnership of scientists and grassroots organizations. NRRSS wants to give scientifically sound advice to decision makers, with the hope of advancing the practice of restoration and policies concerning river restoration and conservation. In addition to encouraging river restoration, the project encourages the recording and evaluation of the success or failure of restoration efforts.

Palmer and her NRRSS colleagues are devoted to doing right by the ecological systems to which they've devoted their careers. Beside the fact that the ecological state of rivers has been the focus of Palmer's career for more than 20 years, like any resident of the Chesapeake watershed, she has a personal interest in river restoration. Palmer and her family live in Davidsonville in a community on the South River, just northwest of the test site at Wilelinor.

And growing up in South Carolina she was surrounded by the type of waterways that would later become her workplace. "I spent a lot of time outside. There were a lot of creeks around where we'd play and catch crayfish."

The youngest of four sisters, Palmer followed her siblings to Emory University in Atlanta for her undergraduate degree. "We grew up poor, and we were the first in our family to go to college." It was at Emory that she took an invertebrate ecology course and was immediately enamored with the elegance of a branch of science devoted to testing and modeling entire systems of life—how organisms interact with their environment.

She met her husband, Mike Nussman, in graduate school in South Carolina, and even their courtship involved rivers. "He's a real angler, and he taught me about fly-fishing." Nussman is the president of the American Sport Fishing Association in Washington, and Palmer says their overlapping interests are a pillar of their relationship. "I do the science and he does the policy side. He's my best friend. We sit every night with a glass of wine and talk as a family about what we're working on."

Palmer's sons, fourteen-year-old Will and eleven-year-old Henry, not only sit in on these dinnertime discussions, they also go out in the field with mom to participate in the experiments. "The boys love checking out rocks and the creatures we've collected in our experiments. They both enjoy being at a stream."

Like many families in the area, the foursome can take off by canoe from their own neighborhood, and they spend time together navigating local waterways. Palmer credits such closeness to the water for the number of area residents who actively participate in river restoration projects. "People that live here are so passionate about protecting waterways."

Citizens' groups are often involved in river restoration projects in partnership with local, state, and federal agencies. For example, the restoration project at the Wilelinor Stream involved Anne Arundel County's Department of Public Works, the Wilelinor Community Association, and the Arlington Echo Outdoor Education Center. The county funded the \$800,000 project (designed by Keith Underwood & Associates and constructed by Baltimore Pile Drivers Co.), sharing the cost of the project with the state. Schoolchildren from area schools helped plant more than 1500 Atlantic white cedar and other native plants in an effort to reestablish a bog that will function to filter out nutrients and pollutants from the 108 acres of impervious surface that surround the stream's watershed.



While the county celebrated the final plantings at the site last April, for Palmer and her colleagues the work is just beginning. Will the cedars mature? Will microbial colonies establish to fix nitrogen and prevent it from reaching the Bay? Will the stream's flow be sufficiently slowed to allow a natural filtration of pollutants from runoff water? These are the types of questions she hopes that funding agencies will ask as they design future restoration projects.

When asked what she hopes the impact of her recent publications will be, Palmer is both optimistic and pragmatic. "The best outcome would be a study to evaluate the effectiveness of different restoration projects-especially the most expensive ones-for ecological and social impacts. A small investment (in such a study) would perhaps change the trajectory of what's been done. It may be that only 5 percent monitoring would be enough if done correctly, but right now, there are no standards for choosing what to monitor."

Is it a Stream or a River?

In common usage, most of us think of a stream as a small length of running water, and a river as something larger and more formidable. Scientists, however, use the terms somewhat interchangeably, noting the difference between a stream and a river is based on size, a sort of continuum between small (stream) and large (river). Dr. Palmer offers this definition of a stream, "It's a low-lying point on land that everything flows into. Streams integrate all that's going on above or below ground-everything that water has gone through. They are the pulse of the local ecosystem."

A recent article in the Capital newspaper listed ten restoration projects the county is planning through October 2007. Price tags for these efforts ranged between \$299,000 and \$2.4 million. Palmer's goal is for government agencies to soon incorporate monitoring into restoration projects like those planned by the county so that restoration efforts can be assessed for their effectiveness and taxpayers can have a better idea of whether their dollars are being well spent.

While scientists, especially those involved with environmental studies, are often portrayed in a constant struggle with growing communities, Palmer is pointedly realistic about land use. "Today most of nature is impacted by human activities. I think we have to focus our research where we are now and where we're going to be, realizing that population growth is not going to decline."

However, Palmer also stresses that for residents of the Chesapeake watershed, the Bay impacts us as much as we impact the Bay. "We can think of healthy soil as a sponge," says Palmer. "If we interrupt the filtration that naturally occurs, through development or other means, we're likely rushing pollutants to the Bay rather than allowing them to be filtered out of the water first." So what can the average citizen do to help care for the Bay? Palmer offers basic principles to follow:

- Limit pesticides and fertilizers used on your lawn. Runoff from these products contributes to algal blooms and dead zones in the Bay.
- Maintain septic systems to avoid adding to the nutrient load in the watershed.
- You don't have to have a lawn full of weeds-but consider surrounding grassy areas with rain gardens that can filter storm water from your property.

- Consider the ecological footprint made by your choices as a consumer-does your produce come from across the globe or a local farmer?
- Limit impervious surfaces such as large driveways or sidewalks on both sides of a street.

In return, Palmer says, we can continue to enjoy all the Chesapeake has to offer. "We like to swim in the Bay, eat its fish-Marylanders have a strong cultural tie to oysters, crabs, and recreational opportunities provided by the water around us." For Margaret Palmer, the work has just begun to protect those opportunities and a Chesapeake way of life.

Annapolis writer Bridget Avila has a degree in ecology and organismal biology and enjoys writing about how science impacts our daily lives.