

www.udel.edu/researchmagazine

ANNUAL REPORT

Volume 1

Number 1

Summer 2009

UNIVERSITY OF DELAWARE
Research

On the path to a new energy future



(Ecosystem Health, continued from p. 23)

Novel Imaging System for Intertidal Areas

Thomas McKenna, associate scientist-hydrogeologist at the Delaware Geological Survey, is working with Jack Puleo and Christopher Meehan, assistant professors in the Department of Civil and Environmental Engineering, to develop a ground-based imaging system



Tom McKenna measures subsurface temperature along Delaware's Indian River.

for the coastal zone that extends beyond the visible light range, to thermal and infrared imagery.

Such a system could aid research on a number of Delaware environmental issues, including water quality, wetland loss, point and nonpoint source pollution, contaminated sites, habitat degradation, coastal erosion, oil spills, and deteriorating sewer and water infrastructure.

Assessing Beachface Flow

Through a combination of field experiments at Cape Henlopen, Delaware, and lab studies, Holly Michael, assistant professor of geological sciences, and William Ullman, professor of oceanography, are working to demonstrate the applicability of new and improved methodologies for studying fluid and particle flow through beachfaces on the time scale of tides and waves.

The research is expected to increase scientific understanding of the ecological benefits of sandy beaches, ultimately aiding beach managers in improving the health of coastal marine ecosystems.

Nanotechnology

John Rabolt, professor of materials science and engineering, is collaborating with John Xiao, professor of physics and astronomy, and Shouheng Sun of Brown University to develop a new class of environmental sensors.

The team is using new and established processing protocols to fabricate nanoparticles and nanofibers, displaying functional groups that interact with such environmental contaminants as arsenic, zinc, chromium, and nickel. These high surface area nanostructures concentrate the toxic atoms/molecules, allowing small concentrations to be analyzed using spectroscopic techniques.

Report puts Delaware River Basin's health in focus

A recent report published by the University of Delaware provides the most comprehensive scientific evaluation of the health of the 13,539-square-mile Delaware River Basin to date, thanks to a collaboration of land-grant institutions in the four states that share the watershed.

The *State of the Delaware River Basin Report*, the culmination of a three-year, \$145,000 project funded by the Delaware River Basin Commission and the Partnership for the Delaware Estuary, was the product of a research consortium that included Cornell University in New York, Rutgers in New Jersey, the Pennsylvania State University, and UD.

The effort was coordinated by the Water Resources Agency in the Institute for Public Administration, College of Education and Public Policy.

"We have a tremendous resource that we need to keep healthy," says Gerald Kauffman, Water Resources Agency director, who was one of the project's principal investigators.

The longest undammed river east of the Mississippi, the Delaware River extends 300 miles from Cape Henlopen, Delaware, to the Catskills. The river is the world's largest freshwater port yet also sustains reviving shad and striped bass fisheries. The basin also provides drinking water to 15 million people, including Philadelphia and New York, Kauffman notes.



In the 1950s, the Delaware River at Philadelphia was called "one of the most grossly polluted areas in the United States." Since then, Kauffman says, environmental policies have sparked the resource's comeback.

Among the Delaware River basin's improvements:

- ◆ Water quality as measured by dissolved oxygen, phosphorus, lead, and zinc levels has improved in most tributaries since 1990.
- ◆ Watershed groups are removing dams that impede fish migration.
- ◆ Over 1,600 federal Superfund sites are being cleaned up.
- ◆ Blue crab landings are up, resulting in a \$7-million economy.
- ◆ Bald eagles are back, with more than 50 nesting pairs.
- ◆ Forests cover more of the basin now than during the 1930s.
- ◆ More than 400 miles of rivers in the basin are included in the National Wild and Scenic Rivers Program.

However, a number of troublesome trends remain:

- ◆ The pesticides atrazine and metolachlor have been detected in 8 out of 10 basin streams.
- ◆ Fish-consumption advisories remain on 4,000 miles of streams.
- ◆ The red knot, a shorebird that gorges on Delaware Bay horseshoe crab eggs during its spring migration from the tip of South America to Canada, is closer to extinction.
- ◆ About 15% of habitat for brook trout, the state fish of New Jersey, New York, and Pennsylvania, has been extirpated.
- ◆ The Atlantic sturgeon is teetering on the brink of extinction. Only two fish per haul were caught in the Delaware in 2004 and none in 2005.
- ◆ Between 1996 and 2001, the Delaware Basin lost 18 square miles of agricultural land, 4 square miles of wetlands, and 48 square miles of forests, while gaining 70 square miles of urban/suburban land.