



CICEET

Serving the technology needs of coastal managers

About CICEET

Established in 1997, the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET) is a partnership of the National Oceanic and Atmospheric Administration (NOAA) and the University of New Hampshire (UNH). Through strategic partnerships and direct investments, CICEET develops tools for clean water and healthy coasts nationwide. CICEET's toolkit contains dozens of field ready technologies—with many more in the pipeline—that address coastal resource problems in three ways:

- **Detection: tools to detect pollution**
CICEET has sponsored the development of a wide range of sensors, microbial rapid detection methods, Harmful Algal Bloom (HAB) detection and identification, and technologies to collect, relay, and synthesize data.
- **Recovery: tools to treat pollution and restore habitats**
These include technologies to restore and protect shorelines, such as a multi-beam bathymetric model to map the ocean floor in high energy coastal environments, *in situ* sediment remediation technologies, and predictive models and methods for seagrass and saltmarsh restoration.
- **Prevention: tools to prevent the impacts of pollution**
These include a unique stormwater treatment evaluation center, methods to reduce nutrient pollution, and models to predict and prevent the impacts of land use change.

CICEET & NERRS

Collaboration with the National Estuarine Research Reserve System (NERRS) is at the heart of CICEET's mission. The reserves' geographic and ecological diversity provides a living laboratory in which CICEET investigators develop and test effective tools for coastal managers. The local and regional networks the reserves foster are important conduits through which CICEET technologies can reach the people who need them most. At the same time, CICEET supports the goals of the reserves and addresses the needs of the communities they serve.

Here's how:

- **Key Infrastructure:** CICEET invests in the equipment needs of the NERRS, including datalogger upgrades to YSI's extended deployment system, the purchase and evaluation of *in situ* YSI fluorimeters, and computers to support the GIS capability at every reserve.

- **SWMP Support:** CICEET is an engaged partner in the NERRS System-Wide Monitoring Program (SWMP), part of the national backbone of IOOS, the Integrated Ocean Observing System. Since 1998, CICEET has invested \$2,007,736 in SWMP-related infrastructure and technology demonstration and evaluation projects. CICEET also supports the training of reserve personnel in monitoring-related technologies, and contributes to the NERRS' ability to provide timely and accurate water quality data.
- **Needs Assessment:** CICEET works with the NERRS to define the priority technology needs of their local coastal resource managers. These assessments help CICEET design competitive funding programs that focus the expertise of leading researchers on the development, demonstration, and application of innovative tools for coastal management.
- **Focus on NERRS:** CICEET brings the talents of leading researchers to bear on the development of technology to address issues related to the NERRS mission. Every project funded by CICEET's Environmental Technology Development Program (ETD) must have a connection—through research, technology development, demonstration, or outreach—to a NERRS site or its watershed. NERRS personnel often serve as advisors or primary investigators for CICEET projects.
- **Serving NERRS Customers:** CICEET's partnership with the NERRS Coastal Training Program (CTP) helps bridge the distance between available tools and the coastal managers who need them, through outreach, training, and communications materials. For example, the CICEET-sponsored UNH Stormwater Center is a resource for CTP coordinators engaged in helping land use decision makers develop stormwater management programs to protect water quality.

Learn more

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Tools for Clean Water & Healthy Coasts



CICEET & New York

The Hudson River National Estuarine Research Reserve is a network of coastal wetlands located along 100 miles of the Hudson Estuary in New York state. The reserve coordinates research, education, and stewardship programs to promote better understanding and management of New York's coasts.

The reserve is also a living laboratory for CICEET investigators testing solutions to the challenges that coastal managers face in a highly developed landscape. These scientists and technology innovators develop tools to prevent or reduce development impacts of on fragile coastal ecosystems that are important economic and cultural resources for the Empire State.



Investing in New York

CICEET has invested approximately \$5.5 million in technology development and demonstration projects to address the priority needs of New York's coastal resource managers. Many of these projects have been concerned with the widespread problem of contaminated sediment in coastal water—from how best to remove harmful chemicals and heavy metals from sediment to monitoring habitats and wildlife. Here are some examples:

Strong as Iron: A legacy of late 20th century manufacturing, PCB pollution is a persistent problem in coastal and estuarine sediments. Recent studies have shown that PCBs can be broken down by a chemical reaction with a type of iron. This project evaluated the technological and economic feasibility of using this approach at the site of contamination.

Netting Nitrogen: Excess nitrogen in wastewater has a significant impact on the environment, yet in most wastewater treatment systems, the tanks are too small and treatment times too short to eliminate harmful nitrogen. This project developed a hollow-fiber membrane system that can be fitted in treatment tanks to dramatically reduce nitrogen in wastewater.

Get the Picture? Invasive plants pose a significant threat to wetland habitats, and better broad-scale monitoring methods can show why some habitats are more susceptible to invasive species than others. This project investigated the use of high-resolution satellite imagery (IKONOS) to map wetland vegetation and pinpoint invasive species.

Coastal Plain Watershed Network: In 1998, the Center for Watershed Protection developed the 8 Tools Framework (8TF) for all aspects of watershed planning including zoning, plan review, construction, and occupancy. This project is adapting the 8TF to the specific parameters, issues and challenges related to effective land use planning in the coastal plain.

Treating Heavy Metal: River and harbor sediment contaminated with toxic heavy metals is commonly "capped" with several feet of sand. The addition of a thick layer of sand can be costly and has the potential to disrupt habitats and navigation. This CICEET project developed a new approach to capping: a patented phosphate-based permeable reactive barrier that binds and stabilizes pollutants, and removes them as a threat from the surrounding ecosystem.

DNA Test: High levels of toxins such as PCBs and dioxin can be fatal to some organisms and can alter the DNA in others, thereby laying the groundwork for harmful genetic mutations in future generations. This project developed a rapid, molecular method to detect DNA damage in estuarine fish, enabling users to evaluate risk and target remediation efforts.

Complete Profile: To understand the complex ecology of estuaries, scientists and managers need continuous information about water quality conditions such as salinity, temperature, chlorophyll fluorescence, suspended sediments, and dissolved oxygen. This project developed an easy-to-deploy autonomous profiler that collects and transmits hourly data about the water column for up to two months. It will soon be commercially available through YSI International, Inc.

Learn more

For more information on these tools, contact Dolores Leonard at CICEET:
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For more information on this reserve, visit:
nerrs.noaa.gov/HudsonBay

<http://ciceet.unh.edu>