Cooperative Institute for Coastal and Estuarine Environmental Technology

CICEET

Program Brief

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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 Sysem (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 flourometers, 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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CICEET & Virginia

Virginia's Chesapeake Bay National Estuarine Research Reserve spans nearly 4,500 acres of oyster reefs, sea grass beds, tidal wetlands, sandy shoals, and mud flats. The reserve coordinates research, education, and stewardship programs to promote better understanding and management of Virginia's coasts.

The reserve also is a living laboratory for CICEET-sponsored scientists who test solutions to the challenges that coastal resource managers face in a rapidly developing landscape. These research scientists and technology innovators develop tools to prevent or reduce the impacts of development on fragile coastal ecosystems that are important economic and cultural resources for the state.

Investing in Virginia

CICEET has invested more than $2.7 million in technology development and application projects in Virginia's Chesapeake Bay. Many of these projects address the priority needs of Virginia's coastal resource managers—from more effective management of stormwater and wastewater to more precise and timely monitoring of coastal water quality. Here are some examples:

Missing Link: Monitoring water quality is a 24/7 process, one that generates the data needed to make decisions that protect ecosystems and human health. Moving that data from a sensor in the water to a laboratory desktop, however, can be expensive and technically challenging. This project developed an affordable, data communications system that provides real-time, two-way communication with water-quality sensor platforms in the field.

Coastal Plain Watershed Network: In 1998, the Center for Watershed Protection developed the 8 Tools Framework (8TF) for all aspects of watershed planning in¬cluding 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.

Updating Acrobat: Nutrient pollution can fuel algal blooms that ultimately deplete oxygen in coastal waters, suffocating marine life. It is critical to understand the scope and severity of coastal and estuarine oxygen depletion to respond effectively. Acrobat—a small, towed instrument—can map the depth and distance of oxygen-poor zones. This project is enhancing Acrobat's ability to collect multiple water samples and measure other types of data to help users understand the scope of low oxygen areas. A new GIS component will provide a 3-D representation of dissolved oxygen distribution.

Running Down Runoff: The biggest threat to coastal water quality nationwide comes from stormwater runoff, which delivers contamination from nutrients like ammonium, nitrogen, and phosphorous directly into coastal waters. This project developed the NanoLAB, a small nutrient monitoring system that uses wet chemistry nutrient assays to test water quality automatically at regular intervals. NanoLAB can be deployed in the field for up to a month.

Shining Light: Nutrient pollution from wastewater and runoff threatens the health of estuaries and the survival and diversity of aquatic species. Accurately monitoring changes in estuaries can provide an early warning of increasing nutrient levels. This project developed an advanced laser fluorescence technique that can detect changes in the physical condition and species composition of phytoplankton communities, pinpointing estuarine changes as they occur.

Future of Farming: Animal agriculture is a significant source of contamination to surface water. Implementing viable technologies to treat the nitrogen and phosphorus in animal waste is essential to maintain a reliable domestic food supply and protect air and water quality. These projects evaluated existing farming practices to develop a new process called Oxygen-Limited Autotrophic Nitrification plus Denitrification (OLAND) to the treatment of dairy waste.

Learn more

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For more information on this reserve, visit:
nerrs.noaa.gov/ChesapeakeBayVA