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 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 & Maine

Spanning 2,250 acres on the southern Maine coast, the Wells National Estuarine Research Reserve is a rich mix of upland fields and forests, beaches, dunes, and rivers. The reserve coordinates research, education, and stewardship programs to promote better understanding and management of Maine's estuaries.

The reserve is also a living laboratory where CICEET-sponsored investigators can 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 Maine

CICEET has invested more than $3.5 million in environmental technology development and application projects related to Maine's Wells National Estuarine Research Reserve. Many of these projects address the priority needs of Maine's coastal resource managers —from the effective management of stormwater runoff to the early, accurate detection of harmful algal blooms that threaten public health. Here are some examples:

Tools for Community Based Ecosystem Management: Ideally, everyone would have the capacity to understand a broad spectrum of issues related to land use before they made decisions that impacted the environment. In the real world, the different perspectives of stakeholders often act as barriers to land use change that takes the ecosystem into consideration. This project is using collaborative learning to overcome these barriers and create a regional training on the use of ecosystem-based management tools for land use planning.

Protecting Plankton: Dredging can have a negative affect on plankton populations, which not only distribute oxygen and nutrients in coastal waters, but also serve as the primary food for many ecologically important finfish and shellfish. This project developed a unique imaging system that can monitor plankton levels before, during, and after a dredging operation to assess the impact. The patented technology is commercially available.

Source Tracking: Wastewater, stormwater, and agricultural runoff often contain disease causing viruses and bacteria that can threaten human health. Understanding the source of the contamination, whether from humans or wildlife, is essential to making effective management decisions. This project developed a new microbial source tracking technique—ribotyping—that uses DNA analysis to verify the source of contaminants.

Sound Stormwater Management: Stormwater carrying nonpoint source pollution poses a significant threat to water quality. So pervasive is the problem, that Phase II of the Clean Water Act mandates that communities develop stormwater management programs to improve water quality. This project developed a Decision Support System that can recommend stormwater site-specific solutions to help community planners meet Clean Water Act requirements.

Habitat Mapping: To understand changes in coastal habitats and the implications of those changes on coastal ecosystems, it is essential to have information about habitat type and quality. This project developed cost-effective technology that can map bottom and water column habitat conditions over large spatial scales quickly and accurately, and then integrate this data with information from sonar, water quality sensors, and GPS.

The Ozonator: Toxic organic chemical pollution is a pervasive problem that impacts estuaries and coastal harbors around the U.S. Treating contaminated sediment *in situ* is an attractive alternative to dredging because it works at the source of contamination, and eliminates the problem of pollution dispersion and disposal of dredged, toxic sediment. This project is developing an "ozonator," which uses ozone gas to treat contaminated sediment *in situ* by breaking down pollutants into by-products bacteria can access.

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/Wells