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 & New Jersey

The Jacques Cousteau National Estuarine Research Reserve encompasses over 114,000 acres in southeastern New Jersey, including terrestrial, wetland, and aquatic habitats within the Mullica River-Great Bay ecosystem. The reserve coordinates research, education, and stewardship programs to promote better understanding and management of New Jersey's coasts.

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

Investing in New Jersey

CICEET has invested more than $2 million in technology development and application projects related to the Jacques Cousteau Reserve. Many of these projects address the priority needs of New Jersey's coastal resource managers—from how to address contaminated sediment to evaluating the overall quality of coastal waters. Here are some examples:

Habitat Mapping: To track changes in coastal habitats and then assess the implications of those changes on 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.

Stormwater Information System: To protect water quality and manage flooding, communities need information on how new development and existing stormwater infrastructure combine to impact surface and groundwater flows in a watershed. A team from Rutgers and the Jacques Cousteau NERRS is developing a watershed-wide, geospatial inventory of existing stormwater infrastructure and models to evaluate the impact of proposed development and mitigation projects on water resources.

A Model Approach: In coastal waters, excess nutrients like nitrogen and phosphorus can fuel Harmful Algal Blooms (HABs) that lead to low oxygen conditions that harm marine life. This project developed a model to identify sources of nutrients and predict the ecological consequences of nutrient pollution.

Early-Warning System: Harmful algal blooms (HABs) like red tide are becoming more frequent and severe. Current monitoring methods are time consuming, expensive, and can't deliver data quickly enough to effectively manage this problem. This project is developing a prototype to rapidly analyze multiple HAB toxins in phytoplankton and shellfish.

Shining Light: Nutrient pollution from wastewater and runoff threatens human health and estuarine ecosystems. Accurate monitoring of phytoplankton can provide an early warning of increasing nutrient levels. This project is developing an advanced laser fluorescence technique that can detect changes in the condition and composition of phytoplankton communities, pinpointing estuarine changes as they occur.

An Eye on Development: To predict how development may intensify pollution, it is critical to understand the patterns of land use change. Traditional methods of monitoring development, such as aerial photography, can be expensive and time consuming. This project evaluated high- and medium-resolution remote sensing and GIS technologies as a cost-effective alternative to monitor the intensity of land cover.

The Drop on Heavy Metal: Polluted river and harbor sediment is commonly "capped" with several feet of sand, a practice that can be costly, disruptive to habitats, and a hindrance to navigation. This project developed a new approach to capping: a phosphate-based permeable reactive barrier that binds and stabilizes toxic heavy metals, removing them as a threat from the surrounding ecosystem.

Learn more

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