



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 & California

California's Elkhorn Slough, San Francisco Bay, and Tijuana River National Estuarine Research Reserves together span more than 7,500 acres of marsh, beach, woodland, grassland, and freshwater pond habitat. The three reserves coordinate research, education, and stewardship programs to promote better understanding and management of California's coasts.

They are also living laboratories where CICEET investigators test solutions to the coastal resource challenges that arise in a rapidly developing landscape. These scientists develop tools and techniques to prevent or reduce development's impact on fragile coastal ecosystems—among the most precious economic and cultural resources in the Golden state.



Investing in California

CICEET has invested nearly \$4 million in environmental technology development and demonstration projects to address the priority needs of California's coastal resource managers—from how best to restore essential habitat and stabilize the shore to the protection of public health through improved monitoring of harmful algal blooms and water pollution at swimming beaches. Here are some examples:

Mapping the Shore: High-energy winds, rains, and storms are slowly reshaping California's iconic coast. Projects to combat erosion are underway, yet accurately evaluating the impact of these efforts in shallow, turbulent water is challenging. This project integrated remote sensing with multibeam sonar to develop a model to monitor the sea floor and habitat change in coastal and estuarine waters. Among its many applications are restoration projects to restore San Francisco's Ocean Beach and hundreds of acres of wetland habitat.

Striking a Balance: Agriculture is a staple of California's economy. At the same time, it generates excess fertilizers and animal waste that can negatively impact coastal environments, and balancing water quality preservation with economic concerns is essential. This project has developed a GIS-based toolkit to help decision makers modify farming and other practices to reduce nutrient loading and preserve water quality.

Pinpointing Pollutants: Toxic pollutants such as PAHs and PCBs accumulate in the sediment of coastal waterways, threatening marine life and human health. To protect marine resources and the communities that surround them, coastal managers must be able to monitor the extent of the contamination. This project is developing a cost-effective sensor to test and monitor the level of organic pollutants *in situ*.

The Ozonator: Traditional approaches to cleaning up toxic organic chemicals like PCBs in coastal sediments involve dredging—an expensive process that can disperse pollutants into the water column as it attempts to remove polluted sediment. This project has developed a prototype “ozonator,” which uses ozone gas to treat contaminated sediment *in situ* by breaking down pollutants into by-products that bacteria can metabolize.

Restoring Eelgrass: Eelgrass serves as critical habitat for marine life and improves water quality by removing excess nutrients. In the face of increasing development, protecting and restoring eelgrass beds has become a priority for coastal managers, but the plants or seeds needed to populate new beds are in short supply. This project is adapting tissue culture technologies to produce genetically diverse plant material and ensure a reliable supply of eelgrass specific to different restoration sites.

How's the Water? Is it safe to swim at the local beach? Water testing technologies that answer that question can take days to process. At the same time, the relationship between pollution indicators like *Enterococcus* and public health impact is not well understood. CICEET has teamed up with the Southern California Coastal Water Research Project (SCCWRP) to evaluate rapid testing methods with the potential to make same-day health warnings possible. The results will be coordinated with an epidemiological study that compares water pollution at swimming beaches with health impact.

Learn more

For more information on these tools, contact Dolores Leonard at CICEET:
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For more information on these reserves, visit:
nerrs.noaa.gov/SanFrancisco
nerrs.noaa.gov/ElkhornSlough
[nerrs.noaa.gov/Tijuana River](http://nerrs.noaa.gov/TijuanaRiver)

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