NOVEMBER 2020

The Project WiCCED Network in Action

PROJECT WiCCED
WATER *in the* CHANGING COASTAL ENVIRONMENT *of* DELAWARE

INSIDE THIS ISSUE:

Critical-Zone Collaborative Network Grant

University of Delaware hydrogeologist Holly Michael is leading a multi-institutional team to better understand and predict changes in saltwater intrusion and their effect on coastal critical zones - the interface where plants, soil, and water meet. The project is supported through a total $4.3 million in funding from the National Science Foundation (NSF) shared by six prominent institutions, including the University of Delaware and Wesley College. NSF's Established Program to Stimulate Competitive Research (EPSCoR) program is co-funding the work.

The project is one of 10 NSF-funded projects recently announced as part of the agency's Critical Zone Collaboration Network, which is infusing $10.5 million per year for five years in research funding to understand critical zones across Earth's system. The UD-led project is the only thematic project selected that focuses on the coastal critical zone.

Dr. Holly Michael is the Co-Prinicpal Investigator and Research Lead of Project WiCCED.

Ghost forests, or dead trees, resulting from saltwater intrusion

Researchers scouting a potential field site in Maryland.

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Inside Threat 3 with A. Scott Andres

Water quality in the Delaware's Sussex County Inland Bays drives the entire ecosystem. Good quality water supports a diverse collection of plants and animals and makes for a beautiful seascape.

Unfortunately, decades of inappropriate agricultural and wastewater disposal practices have overloaded the Inland Bays with nitrogen and phosphorus, or plant nutrients. Too much nutrient input has tipped the natural balance in favor of alga that shade out sea grasses and destroy the habitat for fish, shellfish, and other marine life.

Dr. Andres and his team are monitoring water quality in the Inland Bays with automated sensors that measure every half hour, rain or shine, night and day. The sensors inform them about the timing and magnitude of tides and pollution inputs and the response of alga to those inputs.

In turn, this information helps determine the actions we can take too slow or change the timing of pollution input to bring the ecosystem back into balance. Supporting policies that uphold water quality standards like the Clean Water Act can help mitigate this issue.

Scott Andres is the Co-Lead of Threat 3: Estuarine Nutrient Sources, Loading, Eutrophication, and Acidification.

A monitoring station used to detect pollution in the Inland Bays.

Project WiCCED is made possible by the National Science Foundation EPSCoR Grant No. 1757353 and support from the State of Delaware.

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Inside Threat 3 with Dr. Andrew Wozniak

Dr. Andrew Wozniak is an Assistant Professor at the University of Delaware's School of Marine Science and Policy

Dr. Wozniak's team is working to better understand organic carbon cycling within the Delaware Bay. To do so, they are developing a model using fluorescence spectroscopy and advanced statistics to distinguish the watershed and river/estuarine sources of dissolved organic matter (DOM) in the system.

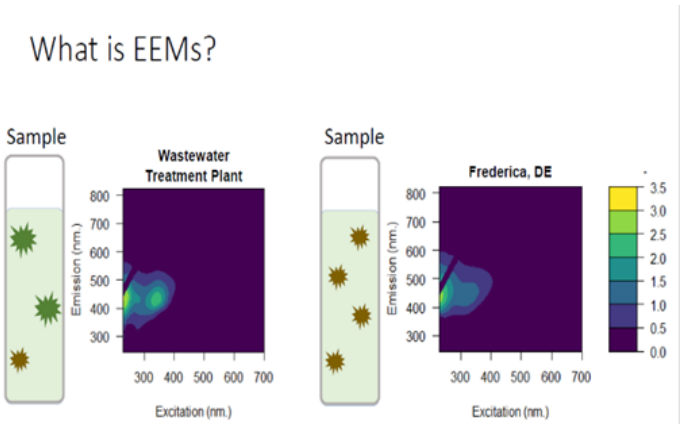
Bacteria in the Bay feed on DOM, and when it is readily available, they can proliferate, causing low oxygen events, causing fish die-offs and shellfish advisories.

During the Summer and Fall of 2019 samples were collected from multiple locations within the Murderkill. These analyses demonstrate differences in spectroscopic characteristics as follows:

1. spatial differences based on location within the watershed as well as a distinct signal from wastewater treatment effluent
2. temporal differences based on season

Sampling and characterization of potential allochthonous (e.g., wastewater, runoff from agriculture, forests, suburban lawns) and autochthonous (produced within the estuary) DOM sources is also planned in the hopes of building a model to enable estuarine DOM fingerprinting.

This effort will target a minimum number of wavelength pairs to monitor with the hopes of being able to conduct this monitoring via sensors in the future.



An excitation emission matrix spectroscopy (EEMS) figure from Dr. Wozniak's lab.

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Undergraduate Summer Scholars Spotlight

Twelve undergraduate students participated in Project WiCCED's Summer Scholars internship opportunity. Our summer scholars were paired with a faculty mentor and were able to choose a research focus from deciphering satellite imagery to analyzing farmers' persistence with agricultural practices. Students attended seminars on poster making, communicating science to a lay audience, and creating a professional social media presence. The program culminated in a research symposium. Despite COVID-19 challenges, the summer scholars were able to adapt to research in a virtual world.

"THROUGH THIS INTERNSHIP, I BUILT STRONG RELATIONSHIPS WITH FACULTY, STAFF, AND STUDENTS FROM ACROSS DIFFERENT DEPARTMENTS, STATES, AND UNIVERSITIES."

- Tahera Atterwala, Summer Scholar at Delaware State University

Checking in on the Coastal Observer App

Download the Coastal Observer App for Free on Android and Apple Products!

The Coastal Observer App was created by the Delaware Resilience Awareness Project (DelRAP) to provide a platform for concerned citizens to share their observations and perceived threats from sea level rise and storms. Since its launch date in August of 2019, over 300 entries have been made by over 140 unique members. The bulk of these have been made in the Delaware area, but several submissions have come from the West Coast, as well as in South America and Europe. The app encourages citizen scientists to engage in their environment by monitoring local weather and water. Scientists then have the ability to look at the data and create observations based on what users are posting.

Users do this in various ways:

- Post pictures to document current weather conditions and their impacts
- Record observations about their how current environmental conditions make them feel
- Describe human impacts to water quality
- Document water levels for impacts to infrastructure, life, or property

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