

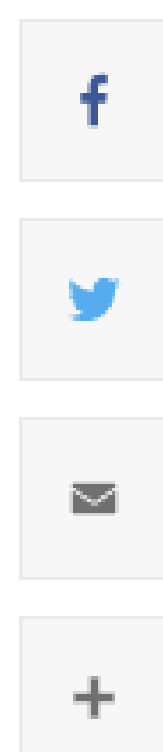
AROUND CORNELL

News directly from Cornell's colleges and centers

Reid to address nitrogen pollution with NSF CAREER Award

By [Eric Laine](#)

February 21, 2023



Reducing nutrient pollution, using a new understanding of how carbon is transformed in the environment to create fuel for nitrogen-consuming bacteria, is the focus of a National Science Foundation Faculty Early Career Development (CAREER) Award received by [Matthew Reid](#), assistant professor of civil and environmental engineering at Cornell.

Reid's proposal is titled "[Unlocking Recalcitrant Carbon to Enhance Denitrification of Nonpoint Source Nitrogen in Woodchip Bioreactors.](#)"

Nitrogen pollution is one of the most intractable drivers of water quality impairment in the United States, contributing to eutrophication, harmful algal blooms, and hypoxia which significantly diminish the economic and recreational value of aquatic environments.

Significant investments in passive treatment technologies, focused on important sources of the pollution have failed to translate into measurable reductions in nitrate export to the Gulf of Mexico and other coastal waters. To achieve water quality targets, better treatment methods are needed.

Woodchip bioreactors, subsurface biofilter systems for treatment of nitrogen-rich waters in under-field drainage, are growing in popularity due to their cost-effectiveness and use of organic waste residues as renewable carbon sources. However, these systems are not able to adapt to dynamic environmental conditions and nitrate loads, and often become carbon-limited over time.

Reid explained: "We're tackling a longstanding environmental problem – nutrient pollution from nonpoint sources like agriculture – using new understanding of how carbon is transformed in the environment and how we can use sensors to help to regulate those processes."

Reid's team is working to control the decomposition of woodchip biomass into labile carbon, so that the activity of denitrifying microorganisms can be stimulated when nitrate loads are high. Methods to stimulate woodchip decomposition into bioavailable carbon are seen as essential to improving the functioning of woodchip bioreactor systems.

"This funding will provide the long-term support needed to grow a new research direction in my lab," Reid said. "We'll also innovate the environmental engineering curriculum with new technologies in sensing and control of water quality in agricultural watersheds."

The CAREER Award is the National Science Foundation's most prestigious award in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.



Provided
Matthew Reid, assistant professor of civil and environmental engineering, researching soil conditions on a farm.



MEDIA INQUIRIES ▾

Get Cornell news delivered right to your inbox.

SUBSCRIBE

YOU MIGHT ALSO LIKE

[Students' tool forecasts manganese in Ithaca water supply](#)

[Bioreactors harness bacteria to treat farm runoff](#)

LINKS

[About the Chronicle](#)
[Media Relations Office](#)
[Sitemap](#)
[Copyright](#)
[Web Accessibility Assistance](#)
[University Relations](#)

CONTACT

Cornell Chronicle
 312 College Ave
 Ithaca, NY 14850
[607-255-4206](tel:607-255-4206)
cunews@cornell.edu

SUBSCRIBE

Daily and weekly newsletters
[Feeds - RSS & JSON](#)