

An integrated approach for understanding and managing Lake Michigan's shifting shorelines

CORE QUESTION:

How can a greater understanding of sediment transport and coastal landowner perceptions help build resilient coastal communities around Lake Michigan?

SHIFTING SANDS

Lake Michigan's 1,640 miles of coastline cross four states and numerous city, township, and county lines. Private landowners, communities, and public officials must find ways to balance diverse needs along the shoreline. This is particularly challenging when environmental conditions and climate change bring rapid changes to the coast. Extreme lake level fluctuations and severe storms result in beach and bluff erosion, dune recession, and impacts to coastal infrastructure requiring regular maintenance to protect coastal development.

Effectively managing Lake Michigan's shorelines requires an integrated understanding of physical, biological, and social factors to develop sustainable shoreline protection measures and policies.

A PHYSICAL-SOCIAL-COMMUNITY APPROACH

A diverse regional research team including investigators from universities in Michigan, Wisconsin, and Indiana aims to foster resilient coastal communities around Lake Michigan through a Physical-Social-Community (PSC) approach.

This project is jointly funded by Illinois-Indiana Sea Grant, Wisconsin Sea Grant, and Michigan Sea Grant. The research team is led by Principal Investigators Guy Meadows, professor and founding director at the Great Lakes Research Center at Michigan Technological University; Chin Wu, professor in the Civil and Environmental Engineering Department at the University of Wisconsin-Madison; and Cary Troy, an associate professor in the Lyles School of Civil Engineering at Purdue University. This project will jointly investigate the challenges to sustainable coastline management from physical, social, and community perspectives along the Lake Michigan coast.



The physical component of the project will involve tracking erosion and sediment movement along the shoreline in three locations around the lake. The Michigan team will participate in field measurement of currents, waves, and sediment transport and will analyze historical aerial photos to assess shoreline changes over time. The physical team will also develop nearshore sediment and shoreline change models to capture the impact of shore protection structures, such as seawalls and harbor jetties.

CONTINUED ON BACK

The social component will focus on perceptions and attitudes among coastal landowners and communities toward risk, sediment movement, and shoreline protection. This will help the team examine dynamics within and between communities that might be preventing them from working together toward healthy shorelines.

The community component will include presenting information about coastal processes to stakeholders and developing a collaborative community of practice around shoreline changes and protection.

By tracking the movement of sediment along the shoreline, assessing attitudes about lakeside development and protection, and devising a framework for empathetic decision-making about coastal resources, this project could positively shift the Lake Michigan shoreline management paradigm.



CONTACT

PRINCIPAL INVESTIGATOR

Guy Meadows

Professor and Founding Director, Great Lakes Research Center, Michigan Technological University
(906) 487-1106 | gmeadows@mtu.edu

Chin Wu

Professor, Civil and Environmental Engineering Department, University of Wisconsin-Madison
(608) 263-3078 | chinwu@engr.wisc.edu

Cary Troy

Associate professor, Lyles School of Civil Engineering, Purdue University
(765) 494-3844 | troy@purdue.edu

michiganseagrants.org/research



MICHIGAN STATE
UNIVERSITY



Michigan Sea Grant helps to foster economic growth and protect Michigan's coastal, Great Lakes resources through education, research and outreach. A collaborative effort of the University of Michigan and Michigan State University, Michigan Sea Grant is part of the NOAA-National Sea Grant network of 33 university-based programs.