

Climate Impacts On Great Lakes Water Quality



ASSESSING THE EFFECTS OF CLIMATE- CHANGE-INDUCED EXTREME EVENTS ON WATER QUALITY AND ECOLOGY IN THE GREAT LAKES

BRIEF SUMMARY

A collaborative research team, supported by the National Science Foundation, will evaluate the land-lake-air feedbacks associated with climate and extreme weather events on Great Lakes communities, industries and the ecosystem.

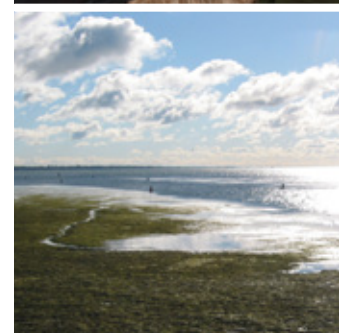
PROJECT GOALS

- Enhance understanding of expected impacts of climate-change-induced extreme events on water quality and ecology, with the Great Lakes, using Lake Erie as a case study; and
- Develop a framework for integrating human and biogeochemical controls on water quality, ecology and climate that transcends and integrates across social, economic, ecological, hydrological and geosciences perspectives.

PROJECT FOCUS

A team of researchers will address the possible effects of extreme weather events caused by climate change on the water quality and ecology in the Great Lakes basin. Scientists will also explore effective management strategies to address the increased frequency and intensity of extreme storm events in the western basin of Lake Erie — the shallowest of the Great Lakes — and the surrounding area. They will examine changes in the seasonality and intensity of summer and winter precipitation events, and the associated land-lake-atmosphere feedback.

The Western basin of Lake Erie is particularly sensitive to human-induced changes to the ecosystem and has been the subject of a number of current and past research efforts. Compared to other parts of the Great Lakes, western Lake Erie has very high relative inputs of nutrients (e.g., phosphorus) and water, leading to a very dynamic, highly productive system with the potential to produce excellent fishing or noxious blooms of various algae.





Scientists will use a building block approach, combining models and data analysis of human, climate, stream and lake components of the Lake Erie system to understand and predict the physical, biological, and human controls of water quality in the Great Lakes region. They will analyze both existing and new information about the physical climate, eco-hydrological and socio-economic impacts. This holistic approach, using the framework of sustainability science, will lead to models and tools to aid decision-makers in the management of coastal resources and the impact of climate change on coastal communities.

FOUR PROJECT COMPONENTS

1. Regional Climate and Extreme Events

Investigate extreme weather event formation and the role of land-lake-air feedbacks through a combination of climate and event-based simulations.

2. Land Use Change and Water Governance

Scientists will examine the implications of social adaptations in communities and agricultural production to predict the likely impact of human responses to climate change on nutrient transport and to determine how communities can best structure their response to climate uncertainty to increase their sustainable well-being.

3. Hydrologic and Ecological Response

Researchers will explore how extreme storm events and land-use interactions result in added or reduced nutrients entering Lake Erie. The impacts of phosphorus, versus invasive species (e.g., zebra and quagga mussels) in the re-eutrophication (increasing productivity) of western Lake Erie will be examined.

4. Outreach and Education

Specialists will promote training, teaching, and learning by integrating research into K-12 education through the development of educational curriculum and public outreach materials. Broad dissemination of research trends, summaries and models will occur through a collaborative effort.

FOCUS AREA

The Western Lake Erie basin area includes Lake St. Clair, Lake Erie, Maumee River, Auglaize River, Blanchard River, St. Joseph River, St. Mary's River, Toledo, Monroe, Findlay and Fort Wayne.

EXTENDING RESEARCH

Goal: Inform and influence decision-making in the Great Lakes region through science-based outreach and education efforts.

The project team includes outreach and education professionals who will apply and extend research results by promoting teaching and learning through the development of K-12 educational curriculum through the *Teaching with Great Lakes Data* website, www.greatlakeslessons.com. The outreach and education team will work to broaden participation of underrepresented minorities through inquiry-based study at the New Tech High School in Ypsilanti, Michigan. Public outreach efforts will include conveying the benefits of the interdisciplinary project group in addressing the project goals.

PROJECT TEAM

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A collaborative team of research investigators, educators and outreach specialists will address the possible effects of weather events on the water quality and ecology in the Great Lakes basin. This project, "Extreme events impacts on water quality in the Great Lakes: Prediction and management of nutrient loading in a changing climate," and related material is based upon work supported by the National Science Foundation under grant number 1039043. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.