Lake Futures: Enhancing Adaptive Capacity and Resilience of Lakes and their Watersheds

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Summary

Lake Futures will provide risk management solutions to enhance the resilience and adaptive capacity of Canada's large lake basins under changing climate and land use.

Aim: to deliver adaptive watershed and lake management solutions that minimize trade-offs between lake ecosystems, water uses, and economic growth.

- Years 1 to 3 will focus on the causes, impacts and mitigation of the re-eutrophication of the lower Great Lakes.
- Years 4 to 7 will see the research expanded to include the rest of Canada and other cold regions of the world.

Great Lakes Basin

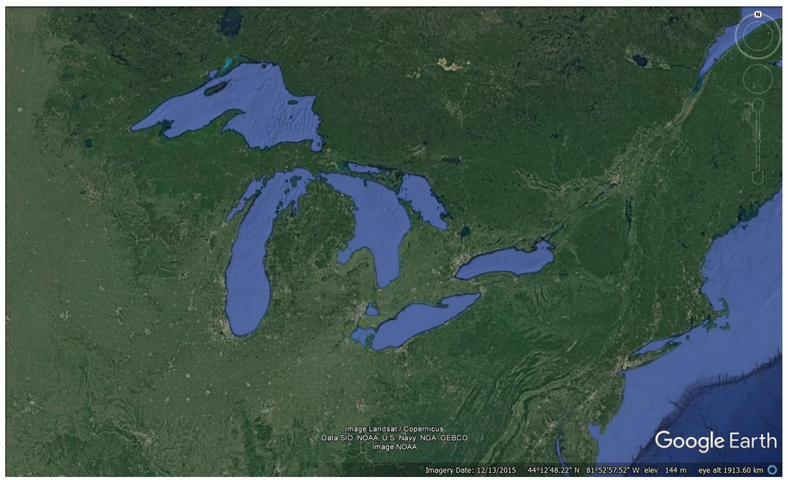
Plays a key role in:

- water supply
- food production
- resource extraction
- hydropower generation
- transportation
- recreation
- biodiversity
- climate regulation

Long-term management strategies and governance models must include the entirety of the lake basin.

Threats:

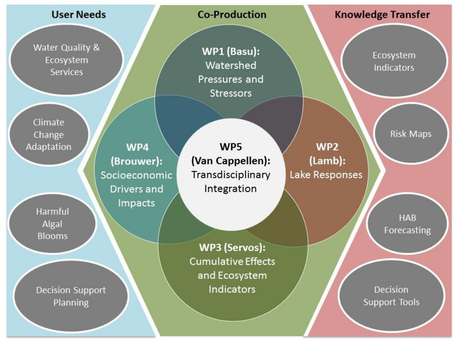
- climate change
- agricultural intensification
- shoreline development
- urbanization



Work Packages

WP 1 - Watershed Pressures and Stressors [Basu (UW)]: advance the predictive understanding and modeling of land-based pressures on lake ecosystems, specifically by quantifying the impacts of climate, land use and land management activities on changing nutrient and DOM loadings

WP 2 - Lake Impacts and Responses [Lamb (UW)]: advance the predictive understanding and modeling of the biogeochemical responses of large lake systems to changes in nutrient inputs and climate warming at temporal scales ranging from days to decades, with an emphasis on nutrient cycling and the management of algal blooms



WP 3 - Ecosystem Impacts [Servos (UW)]: develop and test indicators that measure temporal and spatial changes in the environmental health of keystone ecosystems along the watershed-lake continuum

WP 4 - Socioeconomic Drivers and Impacts [Brouwer (UW)]: support effective decision-making in the Great Lakes Basin through cost-benefit analysis of proposed policy interventions

Image of Cootes Paradise, Ontario, photographed by Christine Ridenour in September 2015

WP 5 - Transdisciplinary Integration [Van Cappellen (UW)]: enhance integration across Lake Futures WPs in order to deliver knowledge-based decision support tools and socially acceptable, user-driven solutions

User Needs

Great Lakes Basin stakeholders (including farmers, community groups, government agencies, and NGOs) have expressed a common need to better understand and to mitigate human impacts on water quality, particularly in view of increasing population pressures, invasive species, and climate and land use changes.

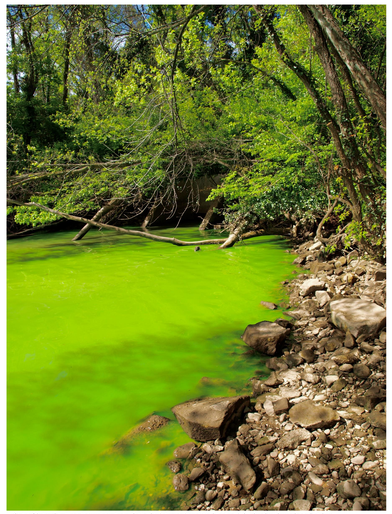


Photo of Eutrophication at a waste water outlet in the Potomac River, Washington, D.C. taken by Alexandr Trubetskoy (Creative Commons, April 5th, 2012) https://en.wikipedia.org/wiki/File:Potomac_green_water.JPG

User needs summary:

1) How do changing water futures alter processes at the watershed scale?
2) How can our developing knowledge of these processes be better integrated into predictive models?
3) What are the major uncertainties related to water quality issues, and how can these uncertainties best be communicated with end users?
4) Can our prediction of physical processes be effectively linked to socio-economic modeling methods to provide a more holistic, systems approach to understanding and guiding water futures?

Outcomes

1. Integrated watershed-nearshore-offshore lake models
2. Composite biological indicators
3. Risk maps
4. Model-data assimilation framework
5. Decision support system and a roadmap

Funding

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Partners

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