

Preparing Coastal Communities for Climate Change:

Translating model results to prepare ports, harbors, and stormwater management facilities in an era of climate variability and scientific uncertainty

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SUMMARY

Tools for Preparing Coastal Communities for Climate Change in the Great Lakes

The Great Lakes Sea Grant Network partnered with NOAA GLERL to address climate change impacts in the Great Lakes region. While the probable impacts of climate change to the freshwater Great Lakes differ from forecasts for the salt water coasts, the major obstacles to motivating decision makers and managers remain the same.

This effort addressed key issues in adapting to climate change: 1) translating global effects on climate to impacts at local and regional scales at which decision makers and stakeholders operate; 2) conveying an understanding of scientific uncertainty inherent in modeling; 3) planning for scenarios of increased variability; and, 4) generating a will to plan and act in a framework of uncertainty and variability.

Combining research and outreach helped us to: 1) involve stakeholders in identifying key climate change impact information needs; 2) conduct modeling for key scenarios; 3) develop an economic tool for ports and harbors; 4) help develop a strategic plan (logic model) for presenting regional climate change information; 5) develop case studies for the ports of Toledo, Ohio and Duluth/Superior, Minnesota & Wisconsin to communicate climate change information; 6) develop centralized tools (website) for climate change communication; and, 7) lay the groundwork for the development of visualization products that can be used to explain climate change information.

Economic Cost Estimate Matrix Tool

With training, the Great Lakes port authorities and others can use the Infrastructure & Dredging Cost Estimate MatrixTool to estimate the repair and/or replacement cost of most any Great Lakes port's infrastructure. This information would, in turn, help the ports demonstrate the value of their infrastructure to decision makers and help increase the awareness of the port and harbor O&M issues in the Great Lakes.

- 1) The Toledo Harbor consists of 28 individual facilities and 55,590,500 sf of federally maintained channel.

Total Dredging Costs for 28 Slips + Federal Channel
= \$11.8 Million (for every foot of depth dredged)

Repair versus Replacement of all vertical slip walls
= \$71.3 Million vs. \$122.8 Million

- 2) The Duluth/Superior Harbor consists of 58 individual facilities and 84,658,343 sf of federally maintained channel.

Total Dredging Costs for 58 Slips + Federal Channel
= \$41.9 Million (for every foot of depth dredged)

Repair versus Replacement of all vertical slip walls
= \$177.1 Million vs. \$298.5 Million

Climate Modeling Results

The development of the CHARM Regional Climate Model and the new downscaling techniques developed by Lofgren show that the impact of climate change on the Great Lakes water level is probably less dramatic than previously estimated.

Table 1. Lake Levels (m above sea level) [±Standard Deviation]

Year	Lake Superior	Lake Michigan-Huron	Lake St. Clair	Lake Erie
1982	183.41 [±0.23]	176.51 [±0.62]	175.23 [±0.47]	174.35 [±0.42]
2055	183.57 [±0.30]	177.09 [±0.77]	175.69 [±0.61]	174.76 [±0.59]

All lakes show rises, the 16 cm rise on Lake Superior being the smallest, and 58 cm on Lake Michigan-Huron being the largest. The standard deviations also increase, by a maximum of 17 cm on Lake Erie.



Chris J. Brinson

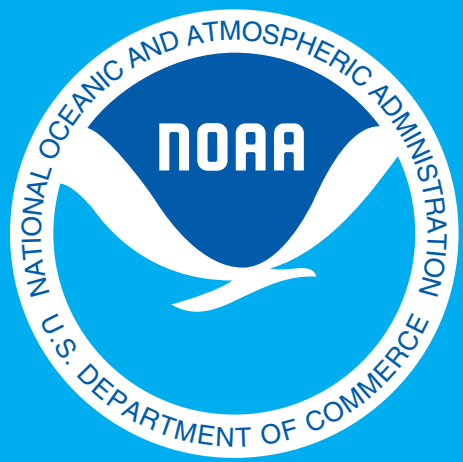
Focus Groups

Key Findings:

- There is a clear need for more specific science-based information on climate change impacts at the regional and local levels.
- More specific information on climate change impacts is needed.
- Great Lakes maritime commerce, both in transit and in port, is dependent on water levels.
- The most dramatic threats come from compound climate variables that impact water levels.
- Most respondents looked at short-term planning windows.
- Watershed management and stormwater issues are important.
- Respondents felt that economics may overshadow climate issues.
- Models of what other communities were doing in the Great Lake region would be helpful.
- And more...

Additional Products

Logic models
Working papers
Annotated bibliography
Webinars
Fact sheets
SARP website



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miseagrant.umich.edu/greatlakes/climate/products.html