

Climate and Weather Tools for Stormwater Planning in the Great Lakes Region

Purpose of the Workshop Series

This workshop series was designed by NOAA and the Water Research Foundation to improve its delivery of information resources for small- and medium- size water utilities useful for building their resilience to a changing climate. Each workshop was organized by NOAA's regional partners and addressed issues identified by and for each region. The workshops offered a forum for exchanging ideas to:

- Identify gaps and improve NOAA climate and weather-related tools and information resources;
- Provide timely and relevant weather and climate information and raise regional-scale awareness of NOAA tools and resources;
- Build regional connections that support small-scale utility decision making;
- Develop improved communication materials and enhance NOAA's tools for local decision making.

The Great Lakes Workshop

The Great Lakes Workshop focused on stormwater management to address flooding caused in part by the increasing number of extreme rainfall events. Scientists described the climate trends in the Great Lakes and demonstrated four precipitation tools. Input from existing city partners indicated they wanted to learn from peers, so the workshop featured a panel of local stormwater practitioners discussing issues and how they approached them. Workshop participants engaged in a robust interaction that yielded insights into information needs and barriers.

Summary

A panel discussion among three stormwater practitioners showed how communities are not necessarily relying on climate downscaling to address current problems and future risk. We heard examples of the value of taking a regional, basin-wide approach to manage flooding. Others were upsizing infrastructure design standards and adopting strategies to achieve multiple social benefits including addressing inequity where the most vulnerable live. And because funding is almost always a problem, communities are adopting innovative financing such as public-private partnerships and community cost sharing to address widespread impervious cover.

A poll of workshop participants indicated that prior to the workshop about half were aware of the four tools demonstrated, but less than half had used them. However, polling after each demonstration showed that participants thought the tools were user friendly and could be used by them or their organizations. When asked about their challenges in using these and the many other available tools, respondents' primary answers related to: time to find and learn how to use tools; knowing their relevance for the intended uses; and having confidence in the tools and results.

Workshop Date :: July 2020

Science and Trends

Annual precipitation in the Great Lakes region has increased by 14%, and the amount of rain falling in the heaviest 1% of storms has increased 35% since 1951, trends that are expected to continue. Many older stormwater systems in the region were built based on historical precipitation trends and do not have the capacity to handle the large amounts of rain falling from more extreme events, leading to flooding as well as contamination from runoff in urban areas and regional watersheds. Water levels in the Great Lakes typically fluctuate, but since 2014 they have risen at an unprecedented rate to recent record highs that have contributed to local shoreline flooding and erosion¹.

¹ Climate Change in the Great Lakes Region References, <http://glisa.umich.edu/gl-climate-factsheet-refs>.

Case Studies

Panel Session Discussions

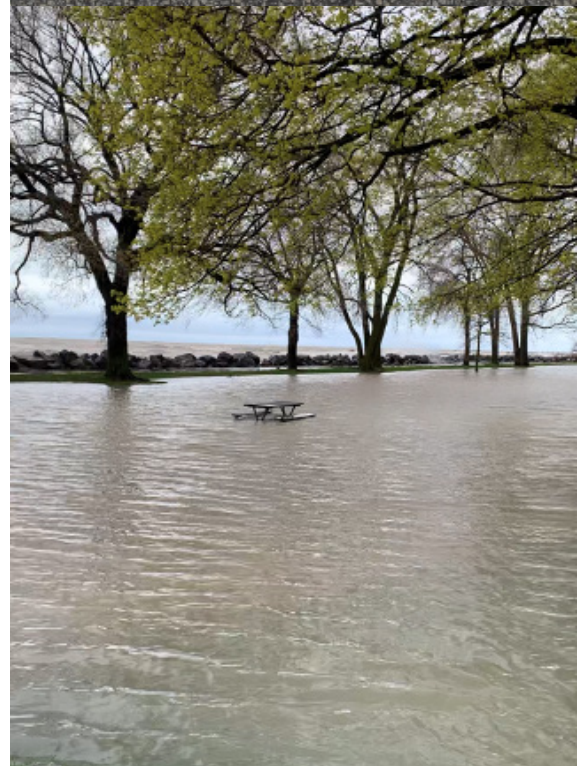
Finding Buy-In for a Regional Approach to Stormwater Management. (Frank Greenland, Director of Watershed Programs, Northeast Ohio Regional Sewer District). It took 15 years, but the 62 communities in the Sewer District's service area were convinced that stormwater management is an essential aspect of wastewater management – leading to a strategy with dedicated funding for a basin-scale plan, including emphasis on flooding in disadvantaged communities.

Keeping up with the Science: Building Resilience in Chicago (Cameron Davis, Commissioner, Chicago Metropolitan Water Reclamation District). MWRD amended its Ordinance to incorporate the State's Bulletin 70 – which is regularly updated to incorporate the latest science on increasing intensity of precipitation due to climate change - and to address the city's history of racism by factoring in disproportionately impacted areas.

Upgrading FIRM Requirements to Manage Flooding in Ann Arbor, MI (Jerry Hancock, Stormwater and Floodplain Programs Coordinator, City of Ann Arbor, MI). Ann Arbor's designation as a Class V1 floodplain underlies a progressive program to control runoff, and the City has proposed an ordinance to address increased incidences of flooding by changing flood plain elevation requirements from the 100-year storm to the 500-year.

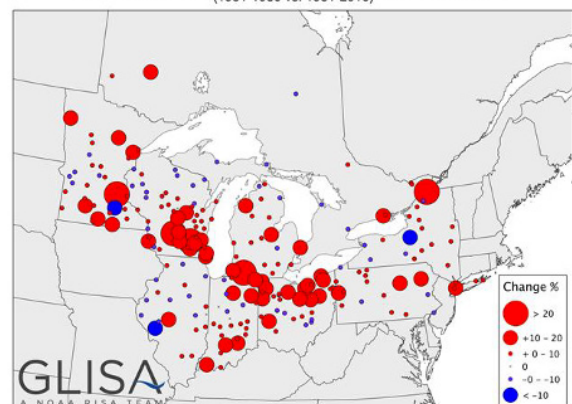


Manhole Cover, Metropolitan Sanitary District, City of Chicago



Clark Square Flooding, Chicago, IL 2019

Observed Changes (%) in the Intensity of the 1% Heaviest Precipitation Days (1951-1980 vs. 1981-2010)



Lessons Learned



Region-Wide Planning: A strategic approach to prioritize investments.

Workshop participants heard examples of communities being frustrated by ongoing problems with sewer overflows, home flooding, and water quality impairments. Wastewater and floodplain managers realized that achieving water quality and flood management goals relied on addressing stormwater. By educating decision makers and the public about the causes of flooding, more and more communities are adopting methods to strategically plan and implement integrated, regional approaches to stormwater management. Increasingly, communities are complementing upgrades to expensive gray infrastructure with widespread adoption of green infrastructure, but presenters underscored the importance of taking a regional, basin-wide, or watershed approach in order to capture enough water to allay the flow of water during large rain events.



Coping with Climate Change: The past is past. The future is now.

In the three case studies presented here, none were conducting elaborate downscaling of climate models. However, they all recognized the inadequacy of relying on historical data and past practices to design their infrastructure and stormwater management strategies. Communities are not standing pat: from regularly updating precipitation statistics based on the most current data, upsizing level of service design standards for all types of infrastructures, to aggressively adopting strategies to manage the flow of water across the landscape, communities are designing resilience for the future.



Improving Equity: Prioritizing the most vulnerable and the least served.

Some of the worst flooding – sewer backups, basement flooding, and catastrophic flooding – occurs in disadvantaged communities, often due to development patterns influenced by historical racism. To redress inequity, utilities are changing the way they prioritize investments, dedicating funds specifically for communities where affordability is an issue, and adopting strategies to achieve multiple social benefits to meet other quality of life needs.



Financing: Partnerships stretch the dollar.

There is never enough money. Revenue is always a challenge. But that isn't stopping communities from achieving their goals. Innovative financing such as public-private partnerships that include pay-for-performance financing for large scale green infrastructure, community cost-shares for installing rain gardens, and stormwater rate structures that include impervious area fee-and-credit systems are all part of the solution.

SCAN ME



> [NOAA Workshop Series Website](#)



> [GLISA Workshop Website](#)

Tools Demonstrated:

> [NOAA Atlas 14](#)

> [Climate Explorer](#)

> [Quantitative Precipitation Forecasts \(QPF\)](#)

> [EPA National Stormwater Calculator \(SWC\)](#)

Information Needs

Time & Relevance

The most frequent and inter-related barriers expressed by survey respondents were time and finding the right tool - time to learn, time to find the appropriate tool especially given how many there are, and the learning curve especially in light of frequent changes. More particularly, discerning the relevance of the tool to the application, the scale, and the particular location is challenging.

Confidence & Useability

Another frequent issue raised was confidence and whether to trust the results of non-standardized tools. Understanding their accuracy and reliability is a challenge when the results look like a 'black box;' respondents suggested they lacked confidence in using nonstandardized tools especially whether they would be approved by, for example, regulators. Understanding limits of the tools and whether they incorporate new information or changing standards is a concern. Finally, some respondents indicated the need to be able to download data and maintain records; one respondent noted that most problems in climate are social, psychological, business related, etc.

Next Steps

Hosting a large, virtual workshop was new for the workshop planners, but early, positive feedback suggests that the format was useful and that participants highly valued the opportunity for interaction and discussion with panelists. The insight from this workshop is helping GLISA better understand practitioner needs to provide regionally relevant climate information in this sector.

This workshop is also informing GLISA's ongoing work on two projects funded by the NOAA Sectoral Applications Research Program and the National Academy of Sciences Gulf Research Program to scale-up and customize a municipal vulnerability assessment template for stormwater management in the Great Lakes as well as the Gulf region.

GLISA's research complements work by others supporting resilience throughout the region, and the lessons learned in this workshop will inform the broader discussion of addressing climate change, including how NOAA can improve the useability of its tools.



To stand pat is a losing match. We are all in the infrastructure management business - and stormwater management is a big deal for any community because it intersects and comes over to your wastewater side.

Frank Greenland

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