Great Lakes Protection Fund
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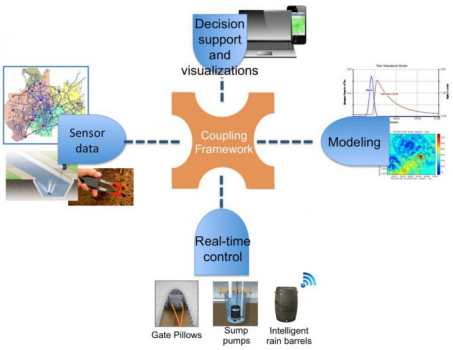
Funded Project

An Intelligent Cyberinfrastructure for the Decentralized Sensing, Modeling and Control of Urban Stormwater

Project No.	1035
Timeline	2014 – 2019
Award Amount	$800,000
Team Leader	Branko Kerkez, University of Michigan
Project Website	http://open-storm.org/



Proposed Intelligent Stormwater Framework

Smart Water Systems Intro Video from Greg DeLiso on Vimeo.

This team developed the next generation of smart stormwater systems that will, when deployed at scale, reduce the occurrence of combined and sanitary sewer overflows and improve the quality of the Great Lakes and their tributaries. The system uses sensor data and powerful, easy-to-use algorithms to control the flow of water before and after storm events in real time.

The team envisions the ability for every community to be able to build a smart stormwater system and has made the tools and resources freely available at open-storm.org. Open-storm is the only open-source, end-to-end platform for water resources management that combines real-time sensing, control, and cloud services. Open-storm fosters engagement by lowering the technological barriers for stakeholders, decision makers, and researchers in communities of all sizes.

During the project, deployments of the technologies grew from 3 to 10 pilot locations:

- Ann Arbor (MI) original pilot location,
- Toledo (OH) original pilot location,
- Milwaukee (WI) original pilot location,
- Berrien County (MI),
- Clinton River Watershed (MI),
- Detroit (MI),
- Huron River Watershed (MI),
- Dallas (TX),
- Mexico City (Mexico), and
- Addis Ababa (Ethiopia).

This team learned that the performance of a passive stormwater system can be matched with stormwater infrastructure half the size, if it is outfitted with real-time controls. They also found that real-time control can reduce nutrient outputs of

watersheds by 30-50 percent, while only needing to control 30 percent of available stormwater assets.

In Ann Arbor, the team found that their technology will:

1.) Reduce 200 pounds of phosphorus per year from stormwater,

2.) Remove seven million gallons of dynamic storage allocation from the peak hydrograph,

3.) Reduce the cost of new construction of storage from $22/gallon to $16/gallon, and

4.) Save the City of Ann Arbor $1 million on new construction.

And in Detroit, the team found that their technology will:

1.) Reduce combined sewer overflows (CSOs) by 100 million gallons, and

2.) Save a projected $500 million (the estimated cost to construct equivalent storage).

The team received significant recognition from the work including:

- National recognition with a first-place finish in the Water Environment Federation LIFT Intelligent Water Systems Challenge,
- A $1.9 million National Science Foundation (NSF) award to take the Open-storm technologies into other communities,
- An NSF CAREER Award to the team leader (one of the most prestigious awards granted to early career researchers by the NSF), and
- An invitation for the team leader to present the project for the National Academy of Engineering Gilbreth Lecture (considered a high honor in the academic community).