



Photos: Chris Faust

Improving Water Quality and Well-Being in Great Lakes Post-Industrial Cities: A Transdisciplinary Collaboration To Assess Detroit's Green Infrastructure

Visualizations: Qjuling Chen, Brad Kasberg, Alex Kinzer



Joan Nassauer, School of Natural Resources & Environment (SNRE) and Natalie Sampson, U-M Dearborn, College of Education, Health & Human Services. Alicia Alvarez, Law School; Allen Burton, SNRE; Margaret Dewar, Taubman College of Architecture and Urban Planning; Shawn McElmurry, Wayne State University, College of Engineering; Catherine Riseng, SNRE; Amy Schulz, School of Public Health; Matthew Weber, Taubman College of Architecture and Urban Planning; Noah Webster, Institute for Social Research.



**Building
Detroit**

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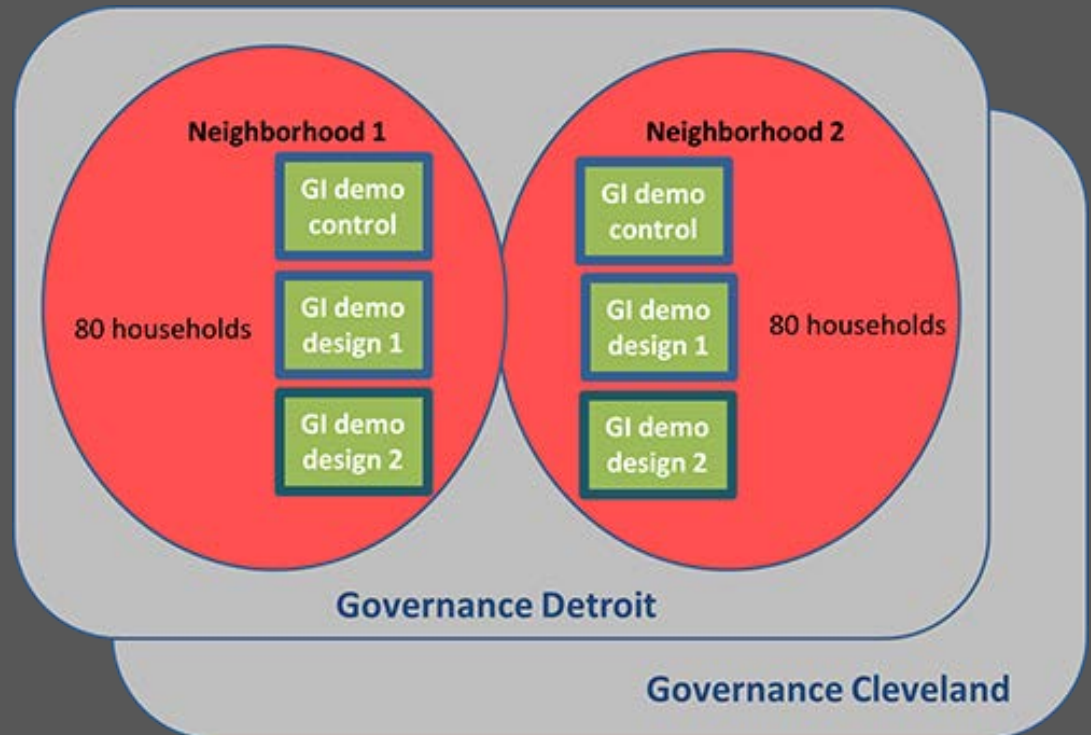
Photos: Chris Faust



Our team built on our collective record of working closely with neighborhood leaders throughout Detroit, and with different City of Detroit departments to build transdisciplinary collaboration. In 2013, DWSD announced a 25-year plan to reduce storm water volume into the city's sewer system through the use of GI, and the United States Department of Treasury permitted the use of approximately \$100 million of the Hardest Hit Fund for demolition of residential structures in Michigan., with Gov. Snyder announcing that Detroit would receive \$52.2 million of that for demolition.

RESEARCH QUESTIONS

- How do different design and planning strategies for land-based GI affect site nutrient and sediment run-off water quality, aquatic toxicology and, potentially, human health exposures?
- How does GI relate to residents' perceptions of the attractiveness and desirability of their neighborhood? Community engagement? Physical and mental health?
- What enables or interferes with implementing GI innovations? What institutional arrangements might help to ensure that potential benefits of GI exist and are sustained?

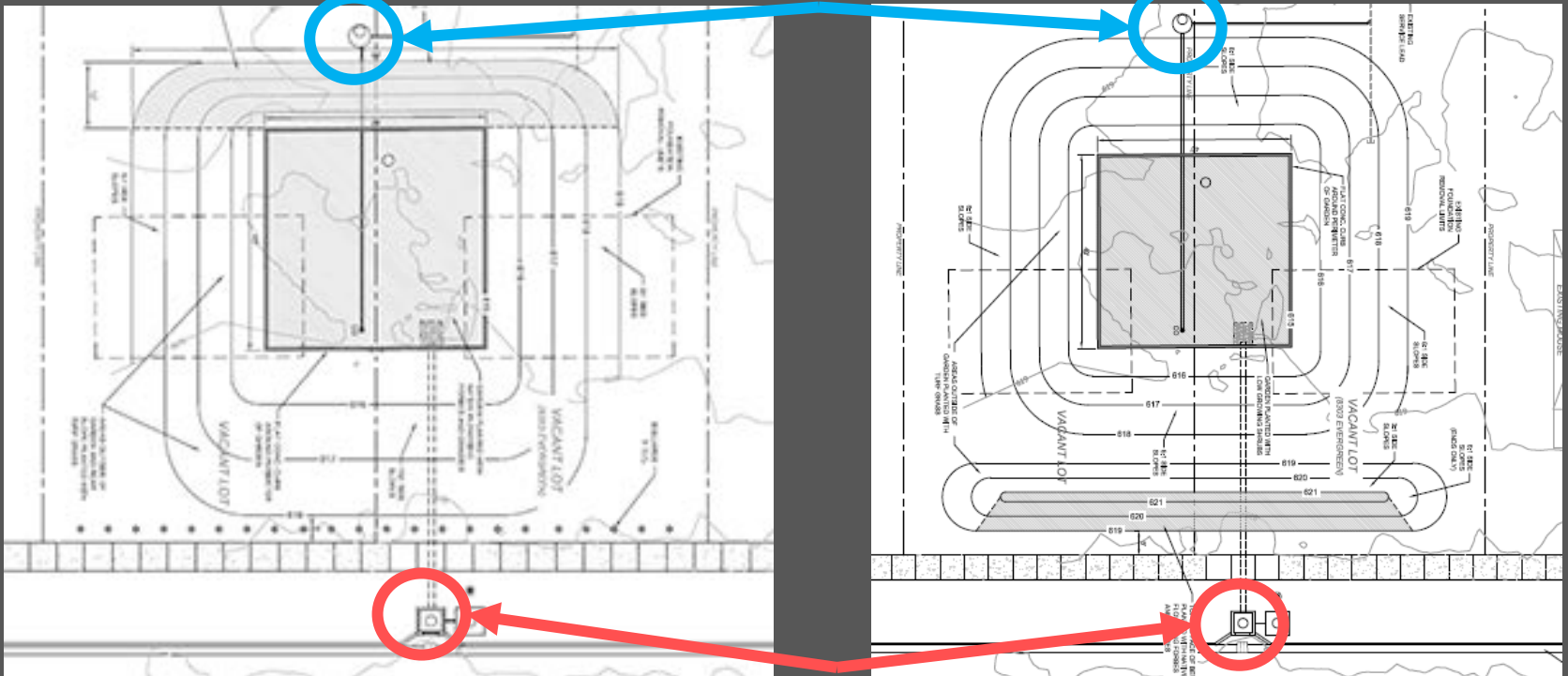




Neighborhood satisfaction, engagement, & health assessment survey completed

- Survey of 164 residents living ≤ 800 feet from center of the clusters . This sample was:
 - 1/3 home owners, mean years in home: 6.4, mean age: 42, 62% female, 93% African American, 63% \leq HS education, mean 1.1 children at home
- 64% had had their basements flooded in the past year – 12% ≥ 3 times
- Major constructs measured include their:
 - familiarity/interaction (i.e., walk by) with sites
 - current & projected perceptions of sites (via visualizations) of: safety, messiness, attractiveness, cared for/neglected
 - potential future impact on home value and neighborhood safety, walkability, sociability, and health
 - community engagement
- Physical and mental health: 35% have hypertension, 27% arthritis, 24% chronic pain, 21% frequent headaches, 19% diabetes, 16% asthma

Assess Outflow



Assess Inflow from street

LANDSCAPE TREATMENT 1

LANDSCAPE TREATMENT 2

Different design strategies for land-based GI on demolition sites

Construct 4 treatment and 2 control sites - .bid pkg completed Oct 2014. Finalized maintenance agreement involving DWSD - February 2015. Out for bids April 2015. Currently under construction.
Stormwater measures for 2015 season:

- Hydrology - quantity of Inflow & outflow, groundwater flow, weather
- Water quality - alkalinity, hardness, anions, N & P, solids, conductivity, pH, temp, metals, PAHs
- Toxicology – caged exposures (D. magna and H. Azteca), whole effluent toxicity

Transition from Obsolete Land Uses to New Ones in the Context of Very Weak Demand The Challenge of Governance

Why is “easy” land use transition nearly impossible?

- Transition is technically difficult; **systems-thinking vs. parcel-level** thinking is also difficult.
- Timing of efficient demolitions and installation of green infrastructure is in conflict with pursuing **adequate community education and participation**.
- **Siloed departments have to coordinate** while they never needed to do so before.
- **State and local government cooperation** is needed, also unusual.
- Laws, ordinances, regulations were written with growth and development in mind.
- Laws, ordinances and regulations do not forbid, but they also don't **encourage lawsuit-leary officials**.
- Cost of the transition is exorbitant because of the issues listed above and lack of routines, need to work out technical challenges, lack of experience in collaboration... but the cost should decrease as some of these difficulties are resolved through pilot projects.

Our project has helped to encourage officials to address several of these governance challenges.

PARTNERS & END-USERS

Our partners:

- Cody Rouge Community Action Alliance
- Detroit Land Bank Authority
- Detroit Water & Sewerage Department
- Warrendale Community Organization

Also, many other potential end users:

- Community leaders (e.g., Greening of Detroit, Sierra Club, Detroit's Green Task Force)
- Decision-makers (e.g., MDEQ SE MI GI Workgroup)
- Residents!



◀ Draft signage for GI sites in Detroit's Warrendale neighborhood

▶ Research team members participating in Keep Cody Rouge Clean & Safe Day May 16, 2015



OUTCOMES

- Participation in community events & meetings
- Design & development of outreach materials and signage
- Design & development of GI sites
- Completion of survey of 164 households in Warrendale neighborhood
- Completion of interviews with community leaders & decision-makers in Detroit & Cleveland
- Research training for 7+ graduate students from Natural Resources, Planning, Statistics
- Papers accepted & presented at scholarly meetings: American Public Health Association, Int'l. Assoc Land Ecol, Ecol Soc America, Healing Our Waters, Urban Affairs Assoc.
- In progress:
 - Stormwater monitoring
 - GI & Well-Being Forum
 - Grant proposals to NIEHS, NSF
 - Reports & manuscripts:
 - Survey results
 - Water quality & quantity
 - Lessons from key informants



Increased social and ecological evidence underlying urban freshwater management GI design shared with community and municipal state leaders, such as the DLBA, DBA, as well as

Increased knowledge of GI and water quality implications among residents in historically underserved neighborhoods and, potentially, engagement in planning for GI interventions

Increased understanding of the legal, institutional, and organizational barriers to reusing vacant land most suited for GI for that purpose and additional ideas for overcoming those barriers