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## Water Resilient Cities: Climate Change, Infrastructure, Economies and Governance in the Great Lakes Basin

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# Water *Resilient* Cities

Climate Change, Infrastructure, Economies and Governance  
in the Great Lakes Basin

April 21 & 22, 2016

Levin College of Urban Affairs

Cleveland State University

Wendy A. Kellogg, Conference Chair



Maxine Goodman Levin  
College of Urban Affairs

# Purpose of the Conference

- Make connections
- Connect conversations of Great Lakes and urban water professionals to urban sustainability managers and planners
- Explore innovative water management frameworks and practices to prepare for climate change
- Deepen our understanding of interdependencies among water infrastructure, economies and governance
- Identify climate vulnerabilities and response assets and opportunities in the legacy cities of the Great Lakes basin



# Who is Here?

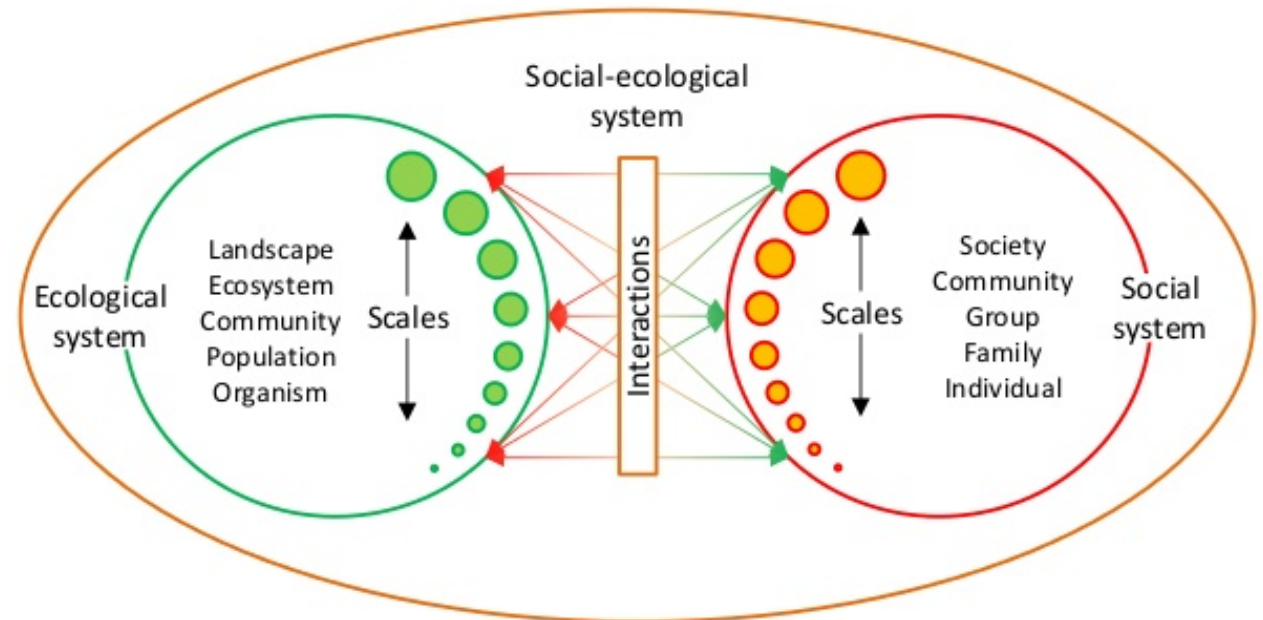
- ~140 people registered
- Vermont, New York, Ohio, Indiana, Michigan, Illinois, Wisconsin, Maryland, Virginia, Massachusetts, North Carolina, Kansas
- City, county and MPO **planning** departments, **engineering** consulting firms, planning and **landscape architecture** firms, **water technology** companies, **recreation** industry, regional **sewer districts**, city **water departments**, watershed and basin-wide **NGOs**, policy and **research centers**, **elected** officials, **Sea Grant** extension agents, **law** firms, **universities**, state and federal **agencies**, **port** authorities, **funding** entities and foundations!

# The Resilience Framework

- Capacity of a **social-ecological system** to absorb or withstand perturbations and other stressors ...to maintain its structure and functions....the degree to which the system is capable of **self-organization, learning and adaptation**.
  - Holling 1973, Gunderson & Holling 2002, Walker *et al.* 2004.
- Ability of assets or systems to **anticipate**, absorb, **adapt** and/or rapidly recover from a disruption event
  - H. Brown, 2014

# Social-Ecological Systems

- Complex, adaptive, co-evolving in reciprocal relationships
- Cities co-evolve with surrounding landscape and waterscape
- Lakes evolve in response to human activities, including cities
- Great Lakes cities different than others

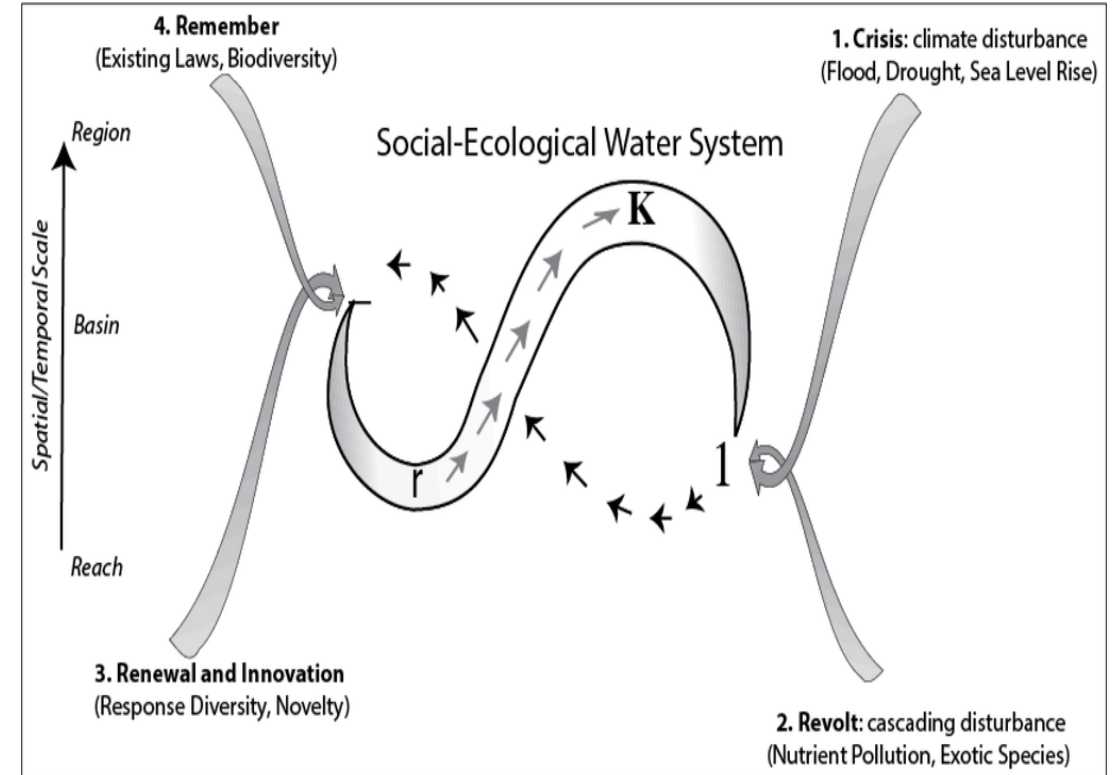
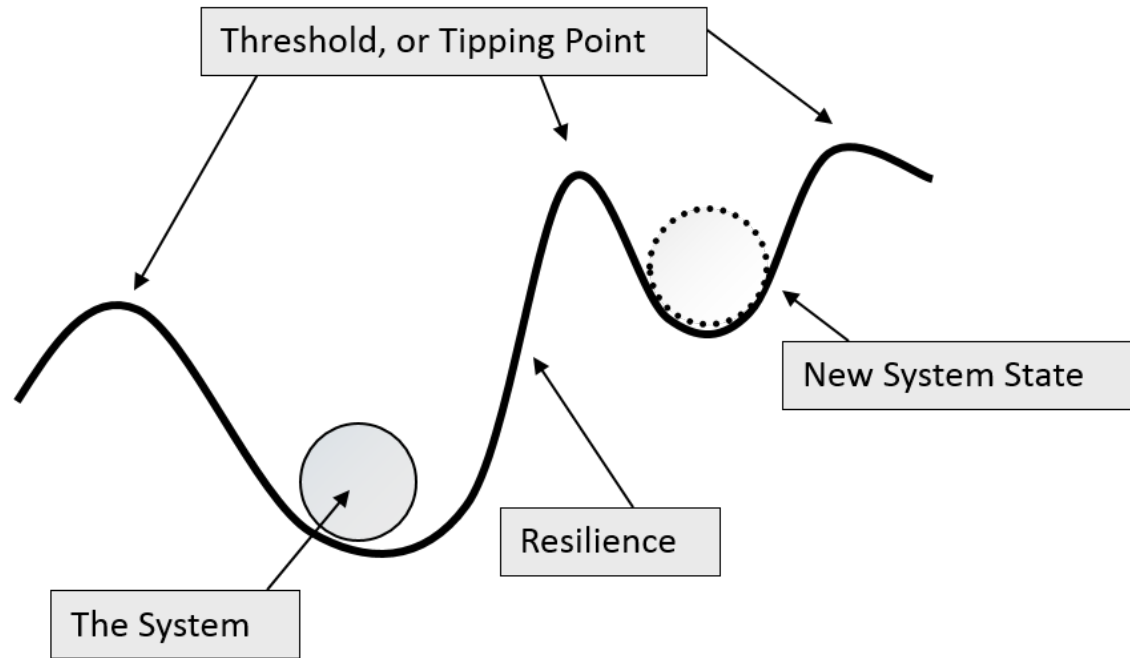


- **Nestedness:** system components may be subsystems with components of their own
- **Adaptiveness:** constant reorganization to maximize resource and energy efficiency
- **Nonlinearity:** manipulation may result in an outcome of unexpected magnitude
- **Emergence:** properties or behavior may only be explainable by the sum of dynamics at a higher level

Martin, et al 2015



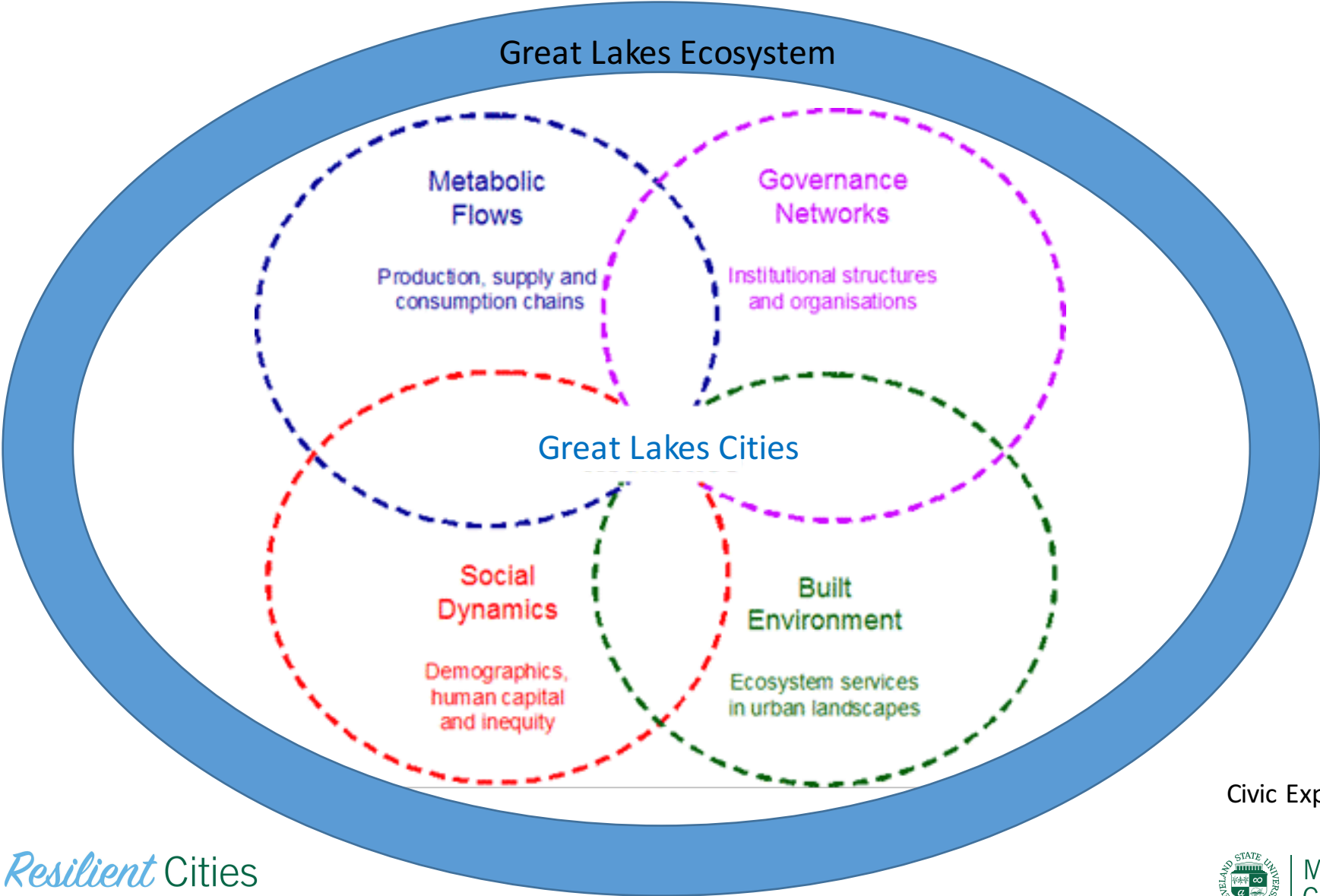
# Change: Thresholds, Tipping Points and Feedback Loops



Cosens, et al 2014

<http://www.conservationofchange.org/resilience/>

# Urban Resilience



Civic Explorer, 2016



# Citations

- Civic Explorer. Urban resilience program, Resilience Alliance. Retrieved April 2016. <https://civicexplorer.wordpress.com/2010/04/01/social-ecological-urban-resilience/>
- Cosens, B., L. Gunderson, C. Allen, M. Benson. 2014. Identifying legal, Ecological and Governance Obstacles, and Opportunities for Adapting to Climate Change. *Sustainability* 6(4): 2338-2356.
- Loring, Philip, PhD. The Conservation of Change. Retrieved April 2016. <http://www.conservationofchange.org/>
- Martin, V., C. Richter, L. Fearnley, B. Wilcox. 2015. Vulnerabilities and Resilience: One Health Approaches for Sustainable Development Ebola Virus Disease Outbreak in West Africa: the Lessons We Have Not Learned. One Health Summit, Davos.

# Plenary

- Elizabeth Gibbons, Director, Climate Center and Program Manager, GLISA, University of Michigan
- John Austin, Director, Michigan Economic Center, Ann Arbor, MI
- Carol Howe, Director, *ForEvaSolutions*, Pittsburg, PA

# Variations on Conference Themes

- Katy Lackey, Water Environment Research Foundation
- Derek Kauneckis, Voinovich School, Ohio University
- Tom Denbow, Biohabitats
- Bryan Stubbs, Cleveland Water Alliance
- Sanda Kaufman, Levin College, CSU