www.epa.gov/research

science in ACTION
INNOVATIVE RESEARCH FOR A SUSTAINABLE FUTURE

Adaptive Management for Urban Watersheds: The Slavic Village Pilot Project

In Cleveland, Ohio (shown above) a dilapidated house next to a vacant lot (left); a vacant lot post-demolition (center), and a vacant lot after extensive post-demolition debris removal, soil management, and plantings (right).

Adaptive management is an environmental management strategy that uses an iterative process of decision-making to reduce the uncertainty in environmental management via system monitoring. A central tenet of adaptive management is that management involves a learning process that can help regulated communities achieve environmental quality objectives.

Adaptive management is the application of resilience theory and can be either active or passive. To develop policy for a system, passive adaptive management will typically employ predictive models that are based on current information to project possible impacts and options. The managed system is then monitored and the results evaluated. From this information, models are improved and policies associated with the system are adapted to the new information. Active adaptive management involves testing of multiple hypotheses about system management at the same time. In active adaptive management, policies are put "at risk" and managers learn from successful and failed policies.

The EPA's Slavic Village Pilot Project is an effort to adaptively reduce stormwater runoff and improve water quality in an urban watershed. The work will be supported by monitoring programs and partnerships with stakeholders that are engaged in an adaptive and ongoing environmental management process. This research is an example of integrating social, economic, and environmental science perspectives into sustainable management approaches that address pervasive environmental challenges.

Slavic Village Pilot Project

Current consent decree settlements for violations of the Clean Water Act (1972) increasingly include provisions for redress of combined sewer overflow (CSO) activity through hybrid approaches that incorporate the best of both gray (high-rate treatment plants, storage tunnels, etc.) and green infrastructure (GI) techniques (plant-soil systems like rain gardens, green roofs, pervious pavement systems, etc.). This project is an opportunity to map out how residential street level GI can be implemented in vacant lots.

The project starts at a small scale to build fundamental knowledge about how GI can improve on present hydrologic circumstances. Over the longer term, this work will address multiple agendas in the articulation and monitoring of environmental justice issues and the provision of ecosystem services (e.g., pollination, primary, and secondary productivity) in urban core areas. The research will be based upon a data-driven, collaborative planning approach that will bring together governance and citizens in a forum for field studies of adaptive management.

The project will use an adaptive management approach to guide a green-infrastructure retrofit of a

U.S. Environmental Protection Agency
Office of Research and Development

EPA 600-F11017
June 2011

neighborhood block located in the Slavic Village Development Corporation area (Cleveland, Ohio). EPA researchers will first gather hydrology and ecosystem services data on two neighborhood blocks (control and treatment). Researchers will then use this data as a basis for collaboration with area citizens on a plan to use green infrastructure (GI) to contain stormflows on the treatment block. Continual monitoring will provide researchers with feedback on the impact of GI implementation and suggest where improvements or modifications may be made.

Project outcomes may include a reduction in stormwater volume contribution to the local CSO, provisioning of an array of ecosystem services, increased social equity around environmental justice issues, and the possibility of increased land values. The entire project centers on managing land for water conservation and storage, community engagement for renewal, and advancing a comprehensive strategy for urban watershed management by adjusting the approach based on field monitoring data, a core adaptive management component.

Objectives

The objectives of the Slavic Village Pilot Project are to:

- Test adaptive management principles in an urban watershed
- Assess the effectiveness of green infrastructure in achieving sustainability goals
- Engage citizens and stakeholders in a collaborative process of environmental management

Project Team

Lead: A. Garmestani, EPA Office of Research and Development (ORD)

Lead: W. Shuster, ORD

S. Jacobs, ORD

B. Dyson, ORD

S. Wu, ORD

M. Heberling, ORD

B. Demeke, ORD

L. Rhea, ORD

B. Furio, EPA Region 5

Contact

Ahjond S. Garmestani, J.D., Ph.D., Office of Research and Development, 513-569-7856, garmestani.ahjond@epa.gov

William D. Shuster, Ph.D., Office of Research and Development, 513-569-7244, shuster.william@epa.gov

Collaborators

Northeast Ohio Regional Sewer District

Slavic Village Community Development Corporation

U.S. Geological Survey

Ohio EPA

Department of Justice

Ohio State University

Emory University

Cleveland Botanical Garden

Cleveland Metroparks

Cleveland Museum of Natural History

Publications

Benson, M.H. and A.S. Garmestani. 2011. Can we manage for resilience? The integration of resilience thinking into American law. Environmental Management (In Press)

Allen, C.R., J.J. Fontaine, K.L. Pope and A.S. Garmestani. 2011. Adaptive management for a turbulent future. Journal of Environmental Management 92: 1339-1345.

Benson, M.H. and A.S. Garmestani. 2011. Embracing panarchy, building resilience and integrating adaptive management through a rebirth of the National Environmental Policy Act. Journal of Environmental Management 92: 1420-1427.

Garmestani, A.S., C.R. Allen and H. Cabezas. 2009. Panarchy, adaptive management and governance: policy options for building resilience. 87 Nebraska Law Review 1036 (invited symposium).

EPA 600-F11017
June 2011