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WATERSHED GOVERNANCE TO PROTECT COMMUNITIES FROM FLOOD RISKS AND WATER QUALITY DEGRADATION

EARLY LESSONS LEARNED FROM IOWA'S WATERSHED MANAGEMENT AUTHORITIES

SUMMARY

Iowa's recent efforts in watershed governance and management provide potential lessons for more effective planning and risk mitigation strategies in states with similar challenges. Iowa created watershed management authorities in response to the 2008 record-setting floods that caused billions of dollars in damage across the state. Prior efforts to establish collaborative watershed governance often have fallen short of their goals. Iowa's recent shift to watershed-based governance offers potential strategic advantages by incorporating local governments. It provides an opportunity to learn more about the role that local governments can play in managing watersheds to protect communities from flooding and water quality risks. The full study will be available in late 2019.

BACKGROUND

Watershed Management Authorities are relatively new to Iowa, but their emergence addresses the longstanding difficulties of flood mitigation and water quality degradation. Since 2010, Iowa has made a strong push to manage rivers, urban and rural drainage infrastructure, and agricultural drainage using a watershed approach. These efforts began largely in response to the record-setting floods in 2008 that caused $3.5 billion in damage across the state. At the same time, the Midwest faces increased flooding and worsening water quality from land use changes, widespread drainage infrastructure, and intensifying rainfall events as the result of climate change.

As part of its response, the Iowa state legislature enabled the formation of Watershed Management Authorities—a method of collaborative watershed governance— to coordinate watershed-based planning, management, and education. WMA participation is voluntary and restricted to combinations of counties, cities, and Soil and Water Conservation Districts.

WMAs have proliferated across Iowa since 2010. There are currently 23 WMAs with another three in the process of forming. Collectively, they cover one-third of the state by area and their watershed boundaries cover all or part of two-thirds of Iowa's counties (Figure 1). While WMAs are relatively young, understanding the early experiences of these collaborations is important to identifying successes and overcoming barriers to reduce flood risks and degraded water quality. This study documents the experiences of four WMAs chosen for variations in longevity (two formed more than a decade ago and two within the past two years) and urban (large cities) and rural character (Figure 2). Researchers collected study data principally from interviews with 50 board members from December 2017 to July 2018.

KEY FINDINGS

- Iowa's Watershed Management Authorities have reduced downstream flooding risks through cooperative agreements among county governments by detaining water flows upstream during large rainfall events.
- Limited funding and inconsistent participation have hindered WMA efforts. Securing policy changes and financial commitments from member entities—even nominal amounts of funding—is important for sustaining long-term participation and leveraging grant opportunities.
- WMAs manage watersheds of different sizes. Early challenges indicate that WMA board participation is problematic in large watersheds with large numbers of member governments. WMAs for larger watersheds may be best for identifying the inventory of projects needed to address flooding and water quality, while smaller WMAs may be more effective in developing specific projects.
- Low public interest remains a major obstacle for WMAs. Forming outreach committees of ex officio board members focused on public education could add valuable capacity for WMA efforts.

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FIGURE 1. Study area

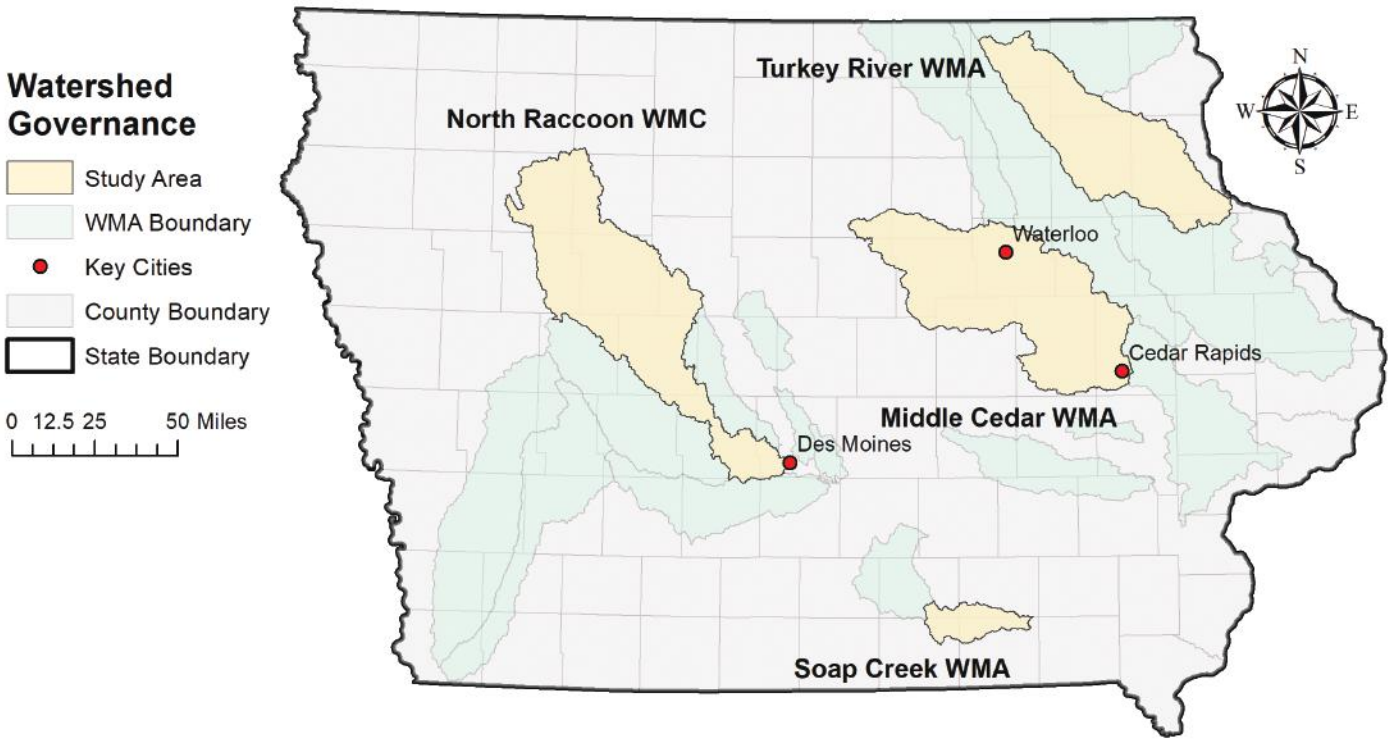

FIGURE 2. WMA details

	Middle Cedar	North Raccoon	Soap Creek	Turkey River
Year formed*	2016	2017	1986	2008
Watershed acres	1,500,000	1,600,000	163,000	1,100,000
Member entities**	34	36	9	35
Largest city (by population)	Cedar Rapids (130,000)	Des Moines (680,000)	Ottumwa (24,000)	West Union (2,300)

*Soap Creek and Turkey River formed voluntarily before converting to become WMAs in 2015 and 2012 respectively.

**Includes watershed coordinators and ex officio board members.

RESULTS

A brief summary of conversations with board members follows, including a discussion of early successes and challenges.

Cooperative agreements and watershed planning

A core aspect of watershed governance is the development of agreements for coordinated planning and collective changes to reduce shared flooding and water quality risks. Although WMAs have had mixed success in developing cooperative agreements, the most successful agreements have focused on managing water flows upstream. The Turkey River WMA succeeded in having all of its county government members adopt new policies to detain more water upstream by using modified culverts. These treatments prevent the further enlargement of culverts under roads and bridges that exacerbate downstream flooding (Figure 3). The Soap Creek WMA developed a watershed plan that identified as its primary goal the construction of a specific number of flood-detention basins. Board members sought out landowners at geographically important locations to voluntarily sign contracts and have projects shovel-ready as funding became available. This approach resulted in 132 of 152 identified basins being built over several decades, achieving 30 percent reductions in flood peaks.

Problem definition and education/outreach

Successful watershed collaboration requires a degree of common understanding of problems and agreement on solutions by decision makers, stakeholder groups, and the public. Research shows that contentious issues can result in lowest-common-denominator agreements. For example, some WMAs have given more attention to allocating funds when available than to tougher changes to land use and

FIGURE 3. Modified culvert in Turkey River Watershed

Modified culverts provide an alternative to enlarging culverts under roads and bridges, a traditional treatment that reduces localized flooding but worsens cumulative flooding downstream. The two photos show a single modified culvert from multiple perspectives. In the photo on the left, water fills up into the pasture ground, which serves as a temporary flood-detention basin during heavy rainfall events. Water drains through the culvert. The photo on the right shows the other side of the modified culvert, which provides slow initial drainage capacity at lower volumes and increased capacity to release water faster as the basin fills up.

infrastructure planning that local governments oversee. Board members say challenges include low public interest and poor understanding of how upstream land uses caused downstream flooding. Limited public concern affects WMAs both directly and indirectly. It affects them directly in terms of the willingness of local elected officials to consider policy changes or financial commitments to WMAs. An indirect impact is that greater public support could lead to greater engagement of state lawmakers to provide WMAs with dedicated funding. The Turkey River WMA, for example, helped implement multiple community-level projects through collaborative approaches with local residents, which raised community awareness and concern for watershed planning in the process.

WMA board members also offered a wide range of reasons for the importance of collaborations. A unified message on the importance of watershed collaboration—through additional attention to how different audiences perceive the problem—could be valuable in shaping public engagement. Potential messages gleaned from board responses included: the importance of cross-jurisdictional communication to inform both upstream and downstream communities of challenges and opportunities; the need to avoid blame by working together on mutually beneficial solutions; and that collaborative planning was cost-effective for preventing future flood damages.

Funding

Funding is a universal challenge. WMAs have no dedicated state tax revenue, and federal grants are very competitive. Some WMAs found success by developing shovel-ready projects across the watershed in advance of available funding. These WMAs were well positioned to act when funding became available. Other WMAs succeeded by having member local governments each contribute small amounts of funding to the WMA. This commitment strengthened federal grant applications.

RECOMMENDATIONS

Based on these early successes and challenges, several "lessons learned" emerge that may be useful to current and future WMAs in Iowa and to watershed management efforts in other states.

Focus on engagement rather than agreement

Board member comments indicated there is an important need to focus on and strengthen the engagement of member entities in WMA priorities. In general, there is support and goodwill for WMAs, but interest wanes when member local governments do not perceive a direct benefit, especially through the allocation of funding for projects.

Successful commitments typically address locally relevant concerns within the bigger picture of the watershed. Watershed plans can play a role in shaping the discussion, but it also is important explain to local constituents how local projects contribute to mitigating watershed problems and why they are worthwhile. This may not lead to agreement or changes in policy in the short-term, but WMAs are well-positioned to make consequential decisions to benefit watershed planning given the potential involvement of local elected officials.

Propose collaborative projects

WMAs could strengthen public understanding by proposing local or collaborative projects to draw attention to the need for and benefits of watershed management. The process of developing a proposal involves building understanding among board members and stakeholders about how different projects can alter flooding and water quality. Working with multiple communities also reinforces the need for a larger-scale focus and the hydrological connections between communities. In additional to collecting other forms of feedback, the participatory approach can strengthen word-of-mouth support, which was important to project implementation in both the Soap Creek and Turkey River WMAs.

Form ex officio committees to complement existing board strengths

WMAs could use informal or formal committees to help identify and recruit non-voting board members who provide expertise to the WMA. The Middle Cedar WMA has a technical committee of ex officio (non-voting) board members with planning, engineering, and outreach expertise, including representatives from the Iowa Flood Center, Iowa Department of Natural Resources, East Central Iowa Council of Governments, and the U.S. Geological Survey. WMAs could also benefit from recruiting fundraising, marketing professionals, or influential community members.

CONCLUSIONS

While WMAs remain early in the process of watershed planning overall, these initial lessons learned provide cause for optimism that these efforts can help to reduce flood risks and improve water quality. Evaluations by the Iowa Flood Center have shown flood peak reductions in both the Soap Creek Watershed and Otter Creek Sub-watershed (within the Turkey River Sub-basin). WMA boards have identified a number of valuable strategies for working together to raise local awareness and support for watershed-based efforts. The cross-jurisdictional engagements have generated new knowledge and understanding across urban and rural constituencies. WMAs' existing efforts provide a positive foundation to support future collaborations.

ENDNOTES

[1]Otto, D. 2010. Economic losses from the floods. In A Watershed Year: Anatomy of the Iowa Floods of 2008, 139–145. Iowa City, IA: University of Iowa Press.

[2]Conservation Learning Group. 2018. A closer look: How does nitrogen move? Ames, IA: Iowa State University. http://conservationlearninggroup.org/files/page/files/drinking_water_infographic_np_9.24.18.pdf (last accessed 18 January 2019); Carpenter, S. R., N. F. Caraco, D. L. Correll, R. W. Howarth, A. N. Sharpley, and V. H. Smith. 1998. Nonpoint pollution of surface waters with phosphorus and nitrogen. Ecological Applications 8 (3):559–568; Falcone, J. A., J. C. Murphy, and L. A. Sprague. 2018. Regional patterns of anthropogenic influences on streams and rivers in the conterminous United States, from the early 1970s to 2012. Journal of Land Use Science 13 (6):585–614; Melillo, Jerry M., T. C. Richmond, and G. W. Yohe eds. 2014. Highlights of climate change impacts in the United States: The third national climate assessment. Washington, D.C.: U.S. Global Change Research Program. https://nca2014.globalchange.gov/highlights/report-findings/our-changing-climate#intro-section-2 (last accessed 3 May 2019).

[3]Estimates calculated in ESRI ArcMap, UTM Zone 16N projection, using National Hydrography Data.

[4]Sabatier, P. A., W. Focht, M. Lubell, Z. Trachtenberg, A. Vedlitz, and M. Matlock. 2005. Collaborative Approaches to Watershed Management. In Swimming Upstream: Collaborative Approaches to Watershed Management, 3–21. Cambridge, Massachusetts: The MIT Press.

[5]While WMAs began in 2010, Soap Creek was initially formed as the Soap Creek Watershed Board in 1986 and has served as a model for WMAs. It formally converted to a WMA in 2015. The 132 projects have been built over several decades, beginning in the early 1990s. Flood reduction estimates can be found in: Iowa Flood Center. 2016a. Soap Creek Watershed Project Evaluation. Iowa City, IA: University of Iowa.

[6]Schlager, E., and W. Blomquist. 2008. Embracing watershed politics. Boulder, Colorado: University Press of Colorado.

[7]Turkey River Watershed Management Authority. (n.d.) "Flood Reduction Plan: A 20-Year Strategic Plan to Increase the Hydrologic Function and Resiliency of the Turkey River Watershed." Postville, IA: Northeast Iowa RC&D. Available at http://turkeyriver.org/wp-content/uploads/2015/06/TRWMA-Flood-Reduction-Plan.pdf (last visited 10 June 2019).

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