Toward Strategic Watershed Management: Lessons from the Boone River Watershed Program Evaluation

Stephanie Enloe  
*Iowa State University*

Lisa A. Schulte  
*Iowa State University*, lschulte@iastate.edu

John C. Tyndall  
*Iowa State University*, jtyndall@iastate.edu

Follow this and additional works at: [http://lib.dr.iastate.edu/nrem_pubs](http://lib.dr.iastate.edu/nrem_pubs)

Part of the [Environmental Monitoring Commons](http://lib.dr.iastate.edu/nrem_pubs), [Hydrology Commons](http://lib.dr.iastate.edu/nrem_pubs), [Natural Resources and Conservation Commons](http://lib.dr.iastate.edu/nrem_pubs), [Natural Resources Management and Policy Commons](http://lib.dr.iastate.edu/nrem_pubs), and the [Water Resource Management Commons](http://lib.dr.iastate.edu/nrem_pubs)

The complete bibliographic information for this item can be found at [http://lib.dr.iastate.edu/nrem_pubs/151](http://lib.dr.iastate.edu/nrem_pubs/151). For information on how to cite this item, please visit [http://lib.dr.iastate.edu/howtocite.html](http://lib.dr.iastate.edu/howtocite.html).
Toward Strategic Watershed Management: Lessons from the Boone River Watershed Program Evaluation

Abstract
Water quality is a growing problem throughout the world. There are over 400 aquatic ecosystems worldwide that have recently recorded hypoxic conditions. Although eutrophication is a natural process in many systems, anthropogenic forces contribute heavily to many of the world’s “dead zones.” The hypoxic zone in the Gulf of Mexico is an example of a system negatively affected by human land use, particularly agriculture in Midwestern states such as Iowa. There are a number of groups throughout the country and the world working to address water quality issues on a landscape level. These groups are contributing to broader understanding of how to conduct watershed management on private and working lands.

Keywords
aquatic ecosystems, hypoxic, eutrophication, monitoring, watershed

Disciplines
Environmental Monitoring | Hydrology | Natural Resources and Conservation | Natural Resources Management and Policy | Water Resource Management

Comments
This is a report from the Landscape Ecology and Sustainable Ecosystem Management Lab (2013): 1.
Introduction

Water quality is a growing problem throughout the world. There are over 400 aquatic ecosystems worldwide that have recently recorded hypoxic conditions. Although eutrophication is a natural process in many systems, anthropogenic forces contribute heavily to many of the world’s “dead zones.” The hypoxic zone in the Gulf of Mexico is an example of a system negatively affected by human land use, particularly agriculture in Midwestern states such as Iowa. There are a number of groups throughout the country and the world working to address water quality issues on a landscape level. These groups are contributing to broader understanding of how to conduct watershed management on private and working lands.

The Iowa Soybean Association (ISA) began work in the Boone River Watershed (BRW) in 2004, when it partnered with The Nature Conservancy and local offices of government agencies to begin a watershed management program for the river. In 2007, Agriculture’s Clean Water Alliance joined the program to implement a water monitoring program in the watershed. Their goal was to determine how agricultural practices influence water quality on the watershed, sub-watershed, and field level to develop and implement science-based solutions. Since that time, a number of other organizations have joined this partnership to work towards a common goal of maintaining agricultural production while protecting water quality and environmental performance in the BRW. The program is unique in its ability to attract diverse stakeholders to find, test, and implement solutions to water quality issues in the BRW. The monitoring network and public-private partnerships in the BRW form the foundation for ongoing watershed management efforts.

In the spring of 2012, with funding from the McKnight Foundation, ACWA and ISA approached a team of researchers from Iowa State University (ISU) to conduct an evaluation of the program. The evaluation was conducted through qualitative analysis of program documents and in-depth interviews with program partners, technical service providers, and farmer stakeholders. The ISU science team prepared this report to share with professionals in the watershed management sector; it presents an account of major findings and lessons learned from the early stages of the Boone River Watershed Program. The goal of this report is to add to the literature on multi-stakeholder watershed management initiatives and provide recommendations to similar programs.
Key Findings and Recommendations

The key findings and recommendations from the BRW Program evaluation are summarized below. Other watershed groups may identify with these findings and choose to implement certain recommendations. Findings are organized under three main lessons:

- All stakeholders benefit from program outputs that are based on water quality monitoring and science-based solutions,

- Partnerships and relationships between diverse stakeholders are vital to watershed management efforts, and

- Multi-stakeholder watershed initiatives would benefit from a transparent, backbone structure to streamline collaboration, planning, and evaluation.
Lesson One: All stakeholders benefit from program outputs that are based on water quality monitoring and science-based

Water quality data are the foundation for a science-based approach in the BRW:

Successful watershed programs often rely on water quality data to mobilize stakeholders and guide adaptive resource management. Data from the water monitoring network in the BRW form the foundation upon which to base outputs and planning decisions. Water quality data allow partners to understand water quality causes, target and evaluate solutions, and attract funding.

Additionally, water quality data have the potential to dispel misconceptions about the existence or severity of water quality issues. Farmers are less likely to make water quality management a priority if they do not think it is a problem or do not believe they contribute to nutrient loading. If accessible, water quality data should be widely disseminated and interpreted it in a way that is meaningful to farmers and other stakeholders. Watershed partners should provide information on potential solutions to nutrient loss alongside the water quality data.

“[Brian] shared a little bit of it with me. Yeah we’re, he’s finding that [nitrate] is getting in there. And the amount shocked me that I’ve seen from him. So we need to get better.

Farmer Respondent
Personalized data engage farmers in program outputs and allow them to measure practice benefits:

Farmers and agronomists find personalized data such as stalk sampling, tissue and soil testing, and bioreactor or tile-line samples invaluable. Where applicable, bioreactor and tile-line data help farmers gauge their contribution to water quality problems and track improvements. Several farmers in the Boone were unaware of the opportunity to conduct tile-line sampling; yet, all indicated they would be interested in this feedback as long as the data remain confidential and they can trust the organization that collects and stores the information.

Personalized data should be presented to the farmer in such a way that they are meaningful. For example, relating nitrate levels to drinking water standards, consequences for aquatic life, economic loss, or the possibility of regulation provides a meaningful context. Additionally, data should be presented alongside suggestions for how a farmer can reduce his or her nutrient loss.

“Working with [ISA staff], that’s given me a lot more insight that I would have had otherwise and it encourages me to keep doing what I’m doing. I think if other farmers know that their water was high in nitrates they might think, ‘well, maybe I am part of the problem,’ but most people don’t know that.”

Farmer Respondent
Watershed partners should provide straight-forward information on benefits and management of BMPs:

Farmers in the BRW are becoming more familiar and comfortable with cost-share practices promoted in the area - particularly strip-till, cover crops, denitrifying bioreactors, and nutrient management plans. However, there are still many misconceptions and uncertainties regarding best management practices. It is important that watershed program partners continually disseminate straight-forward information about practice benefits, potential risks and how they can be mitigated, and effective practice management. Farmer respondents especially value benefits to soil health.

The profitable part - it’s probably harder to measure at this point - but to me it is, from the things I’ve read and from the meetings I've gone to listening to other people, and we're starting to see a lot of it in farm magazines, it's called "soil health". The environment for the living organisms in the soil is improved so much with a cover crop.

Farmer Respondent
Lesson Two: Partnerships and relationships between diverse stakeholders are vital to watershed management efforts

Public-private partnerships enable the BRW Program to strengthen outputs:

Public-private partnerships are formed when organizations from the public and private sectors join forces to work towards a solution to a particular societal problem. Such partnerships are beneficial to all stakeholders, as partners are able to leverage each other's expertise and broaden program outputs. Public-private partnerships in the BRW have allowed the program to reach more farmers, implement monitoring at multiple scales, engage agronomists, leverage funding, and explore practices that provide layered benefits.

When multiple types of organizations work efficiently towards a common goal they can leverage each other’s expertise, avoid necessary redundancies, and identify and fill gaps. The Collective Impact model (http://www.sssireview.org/articles/entry/collective_impact) explores this topic more fully.

“The Iowa Soybean Association, Nature Conservancy, the Soil and Water Conservation District, and us [NRCS] - we’re all looking to reduce nitrogen or to reduce all of the micronutrients and major nutrients in the water supply. And we just go about it in different ways. That’s what is so nice, because they each have their expertise.”

NRCS Respondent
Farmer champions are vital to practice diffusion:

Program partners in the BRW have identified a handful of current or potential “farmer champions,” who promote and help other farmers learn to manage new practices. Research from a number of watershed programs suggests farmer champions significantly improve the visibility and acceptability of watershed management activities. Farmer leaders also help farmers learn about how to manage new practices and detect benefits. Watershed partners should intentionally cultivate leadership among conservation-minded farmers with high social capital. Outreach and training for farmer leaders should be a strategic element of watershed program outputs.

Thirteen of fourteen farmer respondents in the Boon River Watershed evaluation directly or indirectly referenced a particular farmer champion in the area in relation to strip-till and cover crops.
Relationships with program personnel are often the key to a farmer’s willingness to adopt a new management practice:

Program personnel who have relationships with farmers are able reach out in a way that is consistent with each farmer’s values and to address specific questions they might have about a BMP. Farmers in the BRW named a handful of ACWA, ISA, USDA Natural Resource Conservation Service (NRCS), and TNC staff with whom they have close relationships; these same individuals were particularly effective at encouraging farmers to adopt a new practice. Whenever possible, watershed groups should hire individuals who have some farm background, already have a good reputation in the area, are willing to reach out or follow-up consistently with farmers, and who farmers view as unbiased.
The Story of Mr. Jones and the Engagement Curve: The Power of Collective Action, Farmer Champions, and Relationships

Mr. Jones became engaged with the BRW program three years ago, when program partners received an NRCS Mississippi River Basin Healthy Watersheds Initiative (MRBI) grant. The MBRI temporarily raises NRCS cost-share payments for certain conservation practices and funds a watershed coordinator position. Mr. Jones became interested in strip-till – an MRBI cost-share practice – in large part because a prevalent farmer champion in the community has helped program partners advocate the practice.

Mr. Jones approached the MRBI coordinator – a well-respected, retired biology teacher from the area – about signing up for a MRBI strip-till contract. The coordinator told him he was more likely to get into the competitive program if he signed up for cover crops and a denitrifying bioreactor, as well. Mr. Jones was hesitant to try cover crops, so the MRBI coordinator continued to call him and send him information until Mr. Jones felt comfortable with the practice. Mr. Jones eventually signed up for all three practices and learned management strategies by attending field days held by Iowa Learning Farms, The Nature Conservancy, and the farmer champion mentioned previously.

Before signing up for the MRBI, Mr. Jones also worked with the Iowa Soybean Association to put together the requisite nutrient management plan (NMP). The nutrient planning process included tile line sampling for excess nitrate-nitrogen. He did not expect to see any nitrate escaping his tile-line but, to his surprise, the spring data showed he was losing a substantial amount of nitrate from his field. He compared his tile-line information to the data for his sub-basin and for the larger BRW and became aware of his own contribution to water quality issues.

Over the past couple years Mr. Jones has seen a number of benefits from the MRBI practices he implemented. Perhaps the most important change he has seen is a substantial reduction in nitrate leaving his tile-line. Mr. Jones appreciates the ability to quantify practice benefits and is proud to be part of the solution to water quality problems. ISA and other partners recognize Mr. Jones leadership potential and have begun to present him with opportunities to reach out to other farmers. He has become an advocate for conservation and is on track to be another prominent “farmer champion” in the Boone.
Lesson Three: Multi-stakeholder watershed initiatives require a structure to streamline collaboration, planning, and evaluation

*Watershed efforts benefit from a consistent “monitoring network” of social indicators to detect social and behavioral change:*

Program personnel working in the Boone indicated that a clear understanding of social dynamics in an agricultural community is necessary for successful watershed management. Strategic attempts to collect data on social components of the BRW Program include a survey completed in 2010 and the McKnight-funded evaluation. A consistent system to measure and evaluate the social dynamics in the watershed would benefit all partners.


The Hewitt Creek Model has been successfully applied in several Iowa watersheds as a method to involve farmers in collective learning and conservation. Research shows that farmers are more likely to become engaged in conservation activities if they recognize they are part of a community process and are able to learn from and teach each other.

*Wright Morton and McGuire, 2011*
The Collective Impact model presents a structure to strengthen alignment and increase program efficiency:

Program partners in the BRW indicated a need for stronger alignment between organizations. Consistent communication between partners, a clear set of goals and measurements, and strategic use of each organization’s expertise would increase program efficiency and allow partners to improve adaptive capacity. The Collective Impact model – a framework for organizing diverse stakeholders to work on a complex social problem – provides strategies to guide planning.

The BRW Program has assembled some of these components, but others are missing. The timing is opportune to create a backbone organization to support multi-stakeholder collaboration, which would build on program success and further enable partners to implement recommendations in an efficient and strategic manner. Other watershed groups are experimenting with backbone structures to organize coordinated action by diverse partners. There is a widespread need for watershed programs to devise a structure or structures to guide strategic planning amongst multiple stakeholders groups; Collective Impact presents a potential model with which to experiment.

### The Five Conditions of Collective Impact

<table>
<thead>
<tr>
<th>Common Agenda</th>
<th>All participants have a shared vision for change, including a common understanding of the problem and a joint approach to solving it through agreed upon actions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared Measurement</td>
<td>Collection data and measuring results consistently across all participants ensures efforts remain aligned and participants hold each other accountable.</td>
</tr>
<tr>
<td>Mutually Reinforcing Activities</td>
<td>Participant activities must be differentiated while still being coordinated through a mutually reinforcing plan of action.</td>
</tr>
<tr>
<td>Continuous Communication</td>
<td>Consistent and open communication is needed across the many players to build trust, assure mutual objectives, and create common motivation.</td>
</tr>
<tr>
<td>Backbone Support</td>
<td>Creating and managing collective impact requires a separate organization(s) with staff and a specific set of skills to serve as the backbone for the entire initiative and coordinate participating organizations and agencies.</td>
</tr>
</tbody>
</table>
Conclusion

Partners working in the Boone River Watershed have developed a cutting edge program to improve water quality in the area. Organizations from the public, for-profit, and non-profit sectors have found common ground to improve environmental performance while preserving farmer prosperity. Partners’ ongoing dedication to a watershed-wide, multi-scale monitoring program has contributed to their ability to target solutions, leverage funding, and engage new stakeholders.

Overall, partners are on track to meet water quality goals. They should continue to explore the biophysical and social complexities involved with this type of program and experiment with potential solutions. As they move forward, partners will determine how to foster greater stakeholder alignment and engage additional farmers and landowners. These efforts will further contribute to our understanding of how to conduct an effective watershed management program on working lands.
Recommended Resources

Collective Impact Articles

- “Collective Impact”

See [http://www.ssireview.org/articles/entry/collective_impact](http://www.ssireview.org/articles/entry/collective_impact) for the following articles:

- "Channeling Change: Making Collective Impact Work"

- "Understanding the Value of Backbone Organizations in Collective Impact"

- "Embracing Emergence: How Collective Impact Addresses Complexity"

Hewitt Creek Model

- Chapter 15 of Pathways for Getting to Better Water Quality: The Citizen Effect, “Getting to Performance-Based Outcomes at the Watershed Level,” discusses the pilot program for the Hewitt Creek Model for watershed management. The Hewitt Creek Model is a performance-based management system that encourages groups of farmers to collectively explore on-farm conservation practices.

- Performance-based Environmental Management: The Hewitt Creek Model is a short ISU Extension article that briefly describes how to apply the Hewitt Creek Model to a watershed. The article is available here: [http://www.extension.iastate.edu/publications/pm2013.pdf](http://www.extension.iastate.edu/publications/pm2013.pdf)
Recommended Resources Continued

**SIPES and SIDMA**


- The SIPES Handbook provides a complete overview of how to use SIPES and can be downloaded here: [http://wrc.umn.edu/prod/groups/cfans/@pub/@cfans/@wrc/documents/asset/cfans_asset_114353.pdf](http://wrc.umn.edu/prod/groups/cfans/@pub/@cfans/@wrc/documents/asset/cfans_asset_114353.pdf)
  

- The SIDMA Tool helps programs store and analyze SIPES data. It is available here: [http://35.8.121.111/si/home.aspx](http://35.8.121.111/si/home.aspx)

**Recommended Books**

- *Pathways for Getting to Better Water Quality: The Citizen Effect*
  

- *Switch: How to Change Things When Change is Hard*
  
Funded by the McKnight Foundation