Building partnerships to address conservation and management of western Michigan's natural resources

Authors: Isely, Elaine Sterrett, Steinman, Alan D., Isely, Paul N., and Parsell, Michael A.

Source: Freshwater Science, 33(2) : 679-685

Published By: Society for Freshwater Science

URL: https://doi.org/10.1086/675933

Building partnerships to address conservation and management of western Michigan's natural resources

Elaine Sterrett Isely[1,4], Alan D. Steinman[2,5], Paul N. Isely[3,6], and Michael A. Parsell[1,7]

[1]West Michigan Environmental Action Council, 1007 Lake Drive Southeast, Grand Rapids, Michigan 49506 USA
[2]Annis Water Resources Institute, Grand Valley State University, 740 West Shoreline Drive, Muskegon, Michigan 49441 USA
[3]Economics Department, Seidman College of Business, Grand Valley State University, 3064 L William Seidman Center, 50 Front Avenue Southwest, Grand Rapids, Michigan 49504 USA

Abstract: Western Michigan's inventory of natural resources includes Great Lakes sand dunes; grasslands; forests; wetlands; lakes, rivers, and streams; shorelines and riparian habitats; and unique farmland. All of these environmental assets are under continuous threat of fragmentation and development, and numerous efforts have been undertaken to protect them. Many of these local and regional efforts include some level of stakeholder involvement. Collaboration between scientists and local decision makers to address complex environmental-policy problems is not new, and emphasis on stakeholder communication and participation in watershed management and policy development has been increasing. We examined the differences in tackling natural resource management issues through community and academic partnerships at the local and regional levels from the views of 3 researcher participants in 2 case studies. We used the engagement framework outlined in van Kerkhoff and Lebel (2006) as context for a discussion of 2 case studies. The 1st involved a hybrid *integration funders* and *participation facilitators* approach to stormwater management in the Spring Lake Watershed. The 2nd involved a *translation specialists* approach to valuing ecosystem services in a 7-county region that incorporated a *negotiation lobby groups* component in a parcel-level demonstration. These case studies highlight the challenges associated with each of these approaches and describe the partnerships that resulted from these efforts.
Key words: collaboration, ecosystem services, education, engagement, green infrastructure, local decision makers, stakeholder participation, stormwater, watershed management

Western Michigan's inventory of natural resources includes unique and common environmental features, including ~20 km^2 of Great Lakes sand dunes and 122 km of shoreline; 1849 km^2 of grasslands; 1506 km^2 and 2523 km^2 of public and private forest lands, respectively; 237 km^2 of wetlands; 11,075 km of lakes, rivers, and streams; and 414 km^2 of the "most concentrated and richest large region[s] of orchard land" in the world (Versluis 2000, Isely et al. 2010). These resources are under continuous threat of fragmentation and development, and many local and regional efforts have been undertaken to protect these assets. Increasingly, these efforts are including some level of stakeholder involvement.

Collaboration between scientists and local decision makers to address complex environmental policy problems has a long history (Yosie and Herbst 1998, Schlumpf et al. 2001, Kloprogge and van der Sluijs 2006). These social, ecological, and economic systems cannot be captured using a single perspective. Instead, they are best understood through the lens of multiple perspectives (Berkes and Folke 1998). Collaborative processes can create connections between scientific knowledge and practical applications for sustainable natural resource management (Selin and Chavez 1995, Bentrup 2001, Koontz 2003, Koontz et al. 2004, Sabatier et al. 2005, van Kerkhoff and Lebel 2006).

To that end, emphasis on stakeholder communication and participation in watershed management and policy development has been increasing (Margerum 2002, Newham et al. 2007, Gruber 2010). Stakeholder involvement in the

E-mail addresses: [4]esisely@wmeac.org; [5]steinmaa@gvsu.edu; [6]iselyp@gvsu.edu; [7]map002@aquinas.edu

**BRIDGES is a recurring feature of FWS intended to provide a forum for the interchange of ideas and information relevant to FWS readers, but beyond the usual scope of a scientific paper. Articles in this series will bridge from aquatic ecology to other disciplines, e.g., political science, economics, education, chemistry, or other biological sciences. Papers may be complementary or take alternative viewpoints. Authors with ideas for topics should contact BRIDGES Co-Editors, Ashley Moerke* (amoerke@lssu.edu) *(aroy@eco.umass.edu).*

DOI: 10.1086/675933. Received 30 July 2013; Accepted 09 December 2013; Published online 05 March 2014.
Freshwater Science. 2014. 33(2):679–685.

management of natural resources extends scientific expertise by adding local experiences, opinions, knowledge, and social judgment. It is essential to knowing what, to whom, and why it is important, and it encourages broad-based approval of final recommendations and outcomes (Kloprogge and van der Sluijs 2006, Newham et al. 2007, Sevenant and Antrop 2010). Input from all stakeholders should be sought constantly, and comanagement of natural resources should be encouraged (Ducros and Watson 2002).

Collaborative natural-resource management is not a simple solution to complex environmental problems. Multiple stakeholders provide diverse talents and experiences, but they also come with diverse values, beliefs, and cultures that can make coordination of collaborative processes challenging (Ewel 2001, Allison and Hobbs 2010). Greater stakeholder participation can lead to additional expenses in resources and time to establish a foundational understanding of the benefits that natural systems can provide (Ewel 2001, Newham et al. 2007, Walz et al. 2007).

The challenges associated with collaborative processes are even greater as the scope of the partnerships move from local to regional levels (Bonnell and Koontz 2007). Regional-level collaborations are seen as a strategy to add more stakeholders' perspectives. However, additional challenges include maintaining local enthusiasm, volunteer commitment, and community ownership; working within the framework of a multilevel system of community-based natural-resource management (Prager 2010); and applying regional resources at the local level (Isely et al. 2010, Steinman et al. 2011).

The complexity of natural systems and the many different perspectives that come with multistakeholder groups ensure that no single framework fits all collaboration efforts perfectly (Bidwell and Ryan 2006, Margerum 2008). Collaborative processes require approaches that are targeted to the unique attributes of each problem and stakeholder culture. van Kerkhoff and Lebel (2006) proposed a framework of approaches that involves increasing interactions and power sharing between stakeholders and researchers that progress from trickle down, translation specialists, participation facilitators, integration funders, negotiation lobby groups, to learning facilitators. We used this framework to examine 2 collaborative environmental projects in western Michigan: the Rein in the Runoff integrated assessment and the INtegrated Valuation of Ecosystem Services Tool (INVEST), which incorporated 4 of these 6 approaches.

CASE STUDIES

Rein in the Runoff

In 2009, an interdisciplinary research team completed a 3-y collaborative, community-based integrated assessment (IA; cf. Scavia and Bricker 2006), named Rein in the Runoff, which examined the causes, consequences, and corrective alternatives to minimize the negative effects of stormwater runoff from the Spring Lake (Michigan, USA) watershed. IA synthesizes existing natural and social scientific knowledge to solve a natural-resource management problem or to answer an environmental-policy question (Parson 1995, Hillman et al. 2005). Project funding came from Michigan Sea Grant and the National Oceanic and Atmospheric Administration (NOAA), who were interested in applying the IA approach to water-resource problems in Michigan. This project took what van Kerkhoff and Lebel (2006) have identified as an integration funders approach, whereby research funders required certain interactions with project stakeholders, and the researchers linked the funded resources to proposed policy changes and shared responsibility across multiple jurisdictions. Representatives of both funding agencies met with local officials in the Village of Spring Lake (VSL) and Spring Lake Township (SLT) to define the policy question to be addressed before putting out their request for proposals.

Spring Lake is in northwestern Ottawa County on the western side of Michigan's Lower Peninsula, and flows into the Grand River 4.8 km to the east and upstream of Lake Michigan. The watershed encompasses 136.8 km^2 in Ottawa and Muskegon Counties and includes 11 municipalities. Two communities are downstream of Spring Lake along the Grand River toward its outlet at Lake Michigan.

This watershed was selected for the IA for several reasons: 1) it is urbanizing rapidly, so the stormwater runoff issue is increasingly problematic; 2) elected officials in the affected municipalities were ongoing, active participants; 3) Spring Lake's history of cyanobacterial blooms led to an ~$900,000 alum treatment in 2005 (Steinman and Ogdahl 2008) that was paid for by residents, resulting in a sense of stakeholder ownership in Spring Lake's water quality, and 4) the nearshore areas of Lake Michigan have shown signs of impairment from stormwater runoff and nonpoint-source pollution, and Spring Lake is a possible source. Homeowners in the communities surrounding Spring Lake were informed that continued external P loading would reduce the period over which the alum application would be effective (Steinman et al. 2006). Thus, stakeholders had a financial incentive to control stormwater runoff.

The project team, which had expertise in ecology, engineering, planning, economics, law, and policy, adopted what van Kerkhoff and Lebel (2006) define as a participation facilitators approach and solicited and incorporated stakeholder input. Between 2007 and 2009, the project team worked with local stakeholders to address management and stewardship issues regarding stormwater discharges from their communities. Involving stakeholders

in IA is relatively new (Kloprogge and Van Der Sluijs 2006), but primary project goals for Rein in the Runoff included stakeholder education, increased long-term stewardship over local water resources, and more-widespread participation in local stormwater management and control.

Initial stakeholder involvement was limited to government officials from VSL and SLT. These stakeholders helped Michigan Sea Grant define the IA policy question, set project goals, and identify additional stakeholders to participate in the IA. In autumn 2007, the project team expanded its geographic outreach and gave introductory presentations to the other communities within and downstream of the Spring Lake Watershed because best practices in stormwater management require a watershed approach. The Rein in the Runoff team also began to identify specific individuals, organizations, and municipalities to include in a Stakeholder Steering Committee. The inaugural meeting of this committee was held in March 2008, and a small group met quarterly thereafter for ~1 y. This Stakeholder Steering Committee functioned as an informal focus group and helped the project team identify specific issues, additional stakeholders to include in the IA, and other matters related to local and regional stormwater management.

The project team sought to engage a large and diverse number of stakeholders, but broad-based participation remained limited throughout much of the IA, and Stakeholder Steering Committee meetings were attended by a few dedicated stakeholders. The team recognized that a 'more is better' approach ignored the potentially substantial costs of increased participation, including direct costs of facilitation, delayed decision making, turnover in personnel, and taxing of community goodwill (Newham et al. 2007, Walz et al. 2007). The team decided to strive for quality over quantity and went forward with targeted and interested stakeholder participation and communication (Brody 2003, Heathcote 2009) focused on the 3 communities contiguous to Spring Lake in Ottawa County: VSL, SLT, and City of Ferrysburg (FB).

Project team members continued to give informational presentations and demonstrations to various stakeholder groups throughout the IA process at meetings and events to improve local knowledge in stormwater management and to encourage individual and community stewardship of local water resources. Team members wrote newsletter articles, distributed flyers regarding Rein in the Runoff and stormwater management to local businesses and municipal offices, created and maintained a website (http://www.gvsu.edu/wri/reinintherunoff), and maintained a list of ~55 stakeholders throughout the project for correspondence, meeting notices, and updates.

The primary government officials from VSL, SLT, and FB attended Stakeholder Steering Committee meetings, planning meetings, and special meetings and presentations. They also helped connect project team members with local resources necessary to develop and distribute stormwater management educational materials and messages. The stakeholders helped the project team direct the administrative matters concerning the IA, including meeting logistics, communication methods, public meeting formats, and ongoing identification of potential new Steering Committee members and audiences for presentations, displays, or demonstrations.

These stakeholders were particularly valuable in developing the Rein in the Runoff project brand. Branding was a cornerstone for successful project marketing (Berry 2000), and stakeholder participation in the development of the brand may have increased their acceptance of the project results, as evidenced anecdotally by requests to use the brand at the conclusion of the project. Guided by the team's communications expert and a volunteer graphic artist, stakeholders created an easy-to-remember name and simple logo for this project. The branding process was strengthened by integration of traditional marketing tools with communication and service-delivery strategies aimed at different stakeholder groups (Gray 2006). Rein in the Runoff became a recognizable name among participating stakeholders and some of the more active local and regional environmental groups and management agencies in the watershed.

However, governmental officials offered less substantial input on the technical components of the IA, which included identification of areas in the watershed that contributed polluted runoff to local waterways, where new development could be limited or restricted, where stormwater best management practices (BMPs) would be appropriate for implementation, and identification of the most appropriate or most appealing BMPs to watershed residents. When these stakeholders did provide feedback regarding these issues, their input generally was not detailed enough to assist the project team in formulating BMPs specific to the watershed. One issue did result in more detailed feedback. A joint session regarding stormwater ordinances and stormwater utilities generated heated discussion among a larger number of governmental stakeholders from VSL, SLT, and FB, but it did not provide useful guidance for the project team because no consensus emerged regarding whether additional stormwater management solutions were needed within the watershed.

During Rein in the Runoff, the project team witnessed regional collaboration and information sharing among stakeholders and renewed enthusiasm for addressing stormwater management problems at the local level. The project helped leverage other stormwater and natural-resource management projects in the Spring Lake Watershed, including a shoreline assessment to map the developed and natural areas along the Spring Lake shoreline (Thompson and Hansen

2009) and a functional assessment of wetlands in the Lower Grand River watershed to which Spring Lake is a tributary (Denning 2009). However, the conclusion of the Rein in the Runoff IA saw a loss of momentum for implementation of stormwater BMPs. No resources were available for continued collaboration between the research team and government officials from the watershed communities, and turnover in key political leadership appears to have ended progress toward new stormwater solutions for the watershed. Stormwater management is not a priority for current Spring Lake watershed political leaders, who apparently assume that the alum treatment has solved the local stormwater problems. To date, none of the recommended BMPs have been implemented.

INtegrated Valuation of Ecosystem Services Tool (INVEST)

In 2008, an interdisciplinary research team partnered with a regional nonprofit sustainability organization to launch an online educational tool to provide local and regional policy makers in a 7-county area in western Michigan with preliminary information about the costs and benefits associated with the preservation of local green infrastructure. The INtegrated Valuation of Ecosystem Services Tool (INVEST; http://www.INVEST.wri.gvsu.edu) gives conservative economic value estimates, at a coarse scale, for 11 different ecosystem services associated with 8 land use and cover categories found in western Michigan (Isely et al. 2010).

INVEST was designed to help inform local and regional landuse decisions by taking into account market and nonmarket ecosystem service values (Isely et al. 2010). The project team engaged in science communication, acting as translation specialists for regional stakeholders (van Kerkhoff and Lebel 2006). They presented the regional- and county-level data to decision makers and advocates at local meetings and regional conferences hosted by the nonprofit partner and its members for planners, local units of government, state regulatory agencies, and watershed management organizations. Implementation of the tool was limited (Isely et al. 2010). Monetary values presented in INVEST were assigned as averages for the county or the region, but users were unable to translate these data to local, site-specific land use and development scenarios, largely because INVEST could not account for local variation in quality of ecosystem services that could cause large changes in value from broader averages (Isely et al. 2010, 2012).

In 2010, the research team, at the request of its nonprofit partner, began updating INVEST to identify the value of ecosystem services associated with a unique parcel and to develop an ecosystem-services calculator. The parcel chosen for this demonstration project was the Owasippe Scout Reservation (Owasippe) in Blue Lake Township, northeastern Muskegon County. The Nature Conservancy (TNC) had identified Owasippe as an area rich in biological diversity and a target for conservation efforts via its ecoregional planning process.

The most critical threat to Owasippe is development, which could lead to fragmentation and conversion if the camp were closed or sold. In the last decade, the population of Blue Lake Township increased 20.6% (US Census 2000, 2010), and the Chicago Area Council of the Boy Scouts (Boy Scouts), who own the property, were exploring alternative land uses for the site because of declining camp attendance and increasing maintenance costs (Moore 2011). An attempt to sell Owasippe resulted in lengthy legal proceedings culminating in the Michigan Court of Appeals 2010 decision upholding township zoning that restricts development in favor of 'forest recreation' on the property. TNC was exploring conservation outcomes for the parcel with the property owner and other partners to allow Owasippe to continue to operate and to ensure protection of its ecological and recreational resources (Isely et al. 2012).

The project research plan included inventorying and mapping land use and cover for Owasippe and its surrounding parcels, updating and expanding the economic data for valuing the ecosystem services associated with the specific land use and cover types found on the parcel, and building a template for an ecosystem services calculator that could be incorporated into INVEST online (Isely et al. 2012). The project team implemented a negotiation lobby group approach and sought out influential stakeholders to participate in an already contested action agenda (van Kerkhoff and Lebel 2006). The team invited TNC, the Boy Scouts, the Owasippe Outdoor Education Center, Blue Lake Township, and Muskegon County in an attempt to resolve a dispute regarding the future use of the Owasippe parcel.

Initial stakeholder engagement with the research team was limited to site tours, assistance with data collection, and periodic targeted updates. However, the primary goal was to bring these stakeholders—whose relationships were strained by the zoning dispute and litigation—into the same room to discuss conservation outcomes for Owasippe. The project team met with stakeholders on 17 February 2012 and presented the project results (Table 1). The team used the meeting as an opportunity to facilitate communication between the parties and to present alternatives to help resolve the dispute. Table 1 summarizes the calculated ecosystem services values that accrued to the local community for major land cover types. Different land use outcomes also were shown so that policy makers could better understand the nonmarket effects of the possible land uses being discussed. However, the team had no additional resources and was not given a continuing role in the

Table 1. Annual values of ecosystem services for the Owasippe Scout Reservation under different landuse scenarios for the site and the immediately adjacent area. Values in US dollars/km^2.

Land use/metric	Private ownership	Public ownership	Increased development pressure	Development of Owasippe
Forest	$28,664	$45,714	$28,664	$23,474
Grassland	$24,710	$41,760	$27,181	$14,332
Water	$82,088	$143,815	$86,486	$86,486
Wetlands	$70,672	$117,127	$74,131	$32,370
Total annual value of ecosystem services	$597,069	$969,169	$604,643	$242,898
Valuation range (±)[a]	$179,121	$290,751	$181,393	$72,869
Total present value of ecosystem services	$8,529,552	$13,845,271	$8,637,758	$3,469,976
Present value range (±)[a]	$2,558,866	$4,153,581	$2,591,327	$1,040,993

[a] Groothuis 2005

resolution of this matter. To date, the parties remain at an impasse and have been unable to come to a conservation resolution for the Owasippe property.

DISCUSSION

Solving environmental problems requires scientists and experts who are at the forefront of environmental issues and can identify solutions and interested stakeholders to generate action to counteract the problems and help implement appropriate actions (van Kerkhoff and Lebel 2006). Rein in the Runoff used a hybrid integration funders/participation facilitators approach to stormwater management in the Spring Lake Watershed, but primary stakeholder involvement occurred at the local level. In contrast, INVEST began as a translation specialists approach to realize the value of ecosystem services, and then incorporated a negotiation lobby groups component to valuing ecosystem services to conserve environmental assets on the Owasippe parcel (van Kerkhoff and Lebel 2006). In both cases, stakeholder involvement was greater when the focus of the project applications was local.

For both projects, interaction between the research team and the stakeholders provided short-term increases in engagement and power sharing by bringing stakeholders together to discuss problems with a team of experts, which included 3 of the coauthors of this paper. Rein in the Runoff stakeholders had ongoing consultation with the project team to help them come up with solutions to their local stormwater problems. According to post-project surveys, Rein in the Runoff facilitated opportunities for stakeholders to discuss mutual resource management problems, learn current best practices, share resources and information, and take advantage of additional resources for environmental research and implementation projects in their Watershed. INVEST introduced new concepts to western Michigan regarding assigning monetary values to some of the less tangible aspects of environmental assets. It also helped facilitate resumption of negotiations for a conservation outcome for the Owasippe parcel.

However, interviews with participants in both projects indicate that these efforts were unable to sustain stakeholder engagement toward resolution of identified environmental problems beyond the involvement of the academic research teams. As noted by Leach and Pelkey (2001), limited funding for only 1 to 2 y and lack of a skilled facilitator to continue the stakeholder–researcher partnership are barriers to solving environmental problems. After 3 y of ongoing stakeholder engagement in the Spring Lake Watershed, virtually no new stormwater BMPs were implemented beyond completion of the Rein in the Runoff IA. When leadership in one of the key communities changed, that community's prioritization and institutional memory of the lessons learned and resources presented by Rein in the Runoff for resolving stormwater problems within the watershed were lost. Lack of continued funding and loss of momentum limited the other primary communities from implementing recommended BMPs. Similarly, without continued involvement of the academic team in the INVEST projects, use of the tool to value ecosystem services in West Michigan has not advanced. No new funding has become available to implement the online ecosystem-services calculator, and nonmarket values continue to be left out of landuse decision making. Furthermore, the parties involved with Owasippe have been unable to move beyond their respective positions regarding the proposed outcomes for the parcel, and to date neither ownership nor conservation status of that parcel has changed.

Stakeholder engagement to help solve these environmental problems disseminated the research outcomes to a larger audience than traditional research where results are published solely in academic journals. However, these case studies confirm the findings of Leach and Pelkey

(2001). Researcher involvement must continue beyond the conclusion of a project and completion of the project report. Even after substantial investments of time and resources, both Rein in the Runoff and INVEST suffered from a lack of continuing momentum at the conclusion of the funded project term. Researchers and stakeholders need to be able to leverage additional funding, resources, and public support for ongoing investments in the expertise to help move project-based solutions past the research stage. Local projects may have greater support at the community level than broader-scale projects, but few resources may be available to address environmental problems. At the regional level, more resources may be available to address broad-scope problems, but data may not be specific enough to make a compelling case for action within individual jurisdictions. Ongoing expert involvement can and should help move these types of issues toward resolution.

CONCLUSION

These collaborative research projects brought scientists and stakeholders together in an attempt to generate action toward solving 2 different environmental problems in western Michigan. Rein in the Runoff increased the knowledge, engagement, and power of the participating stakeholders by allowing them to provide ongoing feedback to the research team about their needs and desires for resolving their stormwater problem. These stakeholders reminded researchers throughout the project that results needed to come out of the 'ivory tower' of academia and proposed solutions had to be cost-sensitive for them to be implemented. At the conclusion of the project, participating stakeholders expressed appreciation for being included in the presentation of project results, although implementation had yet to take place. INVEST increased knowledge for a larger group of stakeholders regarding the value of nonmarket ecosystem services for the green infrastructure in the region. It also increased knowledge and engagement for the small targeted group of stakeholders that could affect change for the preservation of the green infrastructure associated with the Owasippe Scout Reservation, although the conflict over land use has yet to be resolved.

Collaboration in the management of western Michigan's natural resources has led to important partnerships between researchers and stakeholders locally and across the region. It has increased stakeholder engagement and given them more knowledge and power in understanding what they can do to solve environmental problems in their communities. Challenges remain in the action and implementation of these resolutions, including turnover of decision makers and the limited funding for implementation, but collaborative partnerships have strengthened the region's ability to preserve and manage their environmental resources.

ACKNOWLEDGEMENTS

The Rein in the Runoff Integrated Assessment project was funded by a grant from Michigan Sea Grant and the National Oceanic and Atmospheric Administration and by substantial in-kind contributions by the Annis Water Resources Institute at Grand Valley State University. The INVEST project was originally funded by a grant from People and Land through the W. K. Kellogg Foundation. The Owasippe Demonstration Project was funded by a grant from the Meijer Corporation. The authors thank all of the stakeholders who participated in these projects for their time, energy, and resources. They also thank the members of the project teams who participated in the various components of each project for offering their expertise, time, and commitment to preserving western Michigan's environmental assets.

LITERATURE CITED

Allison, H., and R. Hobbs. 2010. Natural resource management at four social scales: psychological type matters. Environmental Management 45:590–602.

Bentrup, G. 2001. Evaluation of a collaborative model: a case study analysis of watershed planning in the Intermountain West. Environmental Management 27:739–748.

Berkes, F., and C. Folke. 1998. Linking social and ecological systems: management practices and social mechanisms for building resilience. Cambridge University Press, Cambridge, UK.

Berry, L. L. 2000. Cultivating service brand equity. Journal of the Academy of Marketing Science 28:128–137.

Bidwell, R. D., and C. M. Ryan. 2006. Collaborative partnership design: the implications of organizational affiliation for watershed partnerships. Society and Natural Resources 19: 827–843.

Bonnell, J. E., and T. M. Koontz. 2007. Stumbling forward: the organizational challenges of building and sustaining collaborative watershed management. Society and Natural Resources 20:153–167.

Brody, S. D. 2003. Measuring the effects of stakeholder participation on the quality of local plans based on the principles of collaborative ecosystem management. Journal of Planning Education and Research 22:407–419.

Denning, R. 2009. Functional Wetlands Assessment Maps for the Spring Lake Watershed. Grand Valley State University, Annis Water Resources Institute, Muskegon, Michigan. (Available from: ftp://geoportal.wri.gvsu.edu/awri_website/atlas_appendix.pdf)

Ducros, C., and N. M. Watson. 2002. Integrated land and water management in the United Kingdom: narrowing the implementation gap. Journal of Environmental Planning and Management 45:403–423.

Ewel, K. C. 2001. Natural resource management: the need for interdisciplinary collaboration. Ecosystems 4:716–722.

Gray, B. J. 2006. Benchmarking services branding practices. Journal of Marketing Management 22:717–758.

Groothuis, P. A. 2005. Benefit transfer: a comparison of approaches. Growth and Change 36:551–564.

Gruber, J. S. 2010. Key principles of community-based natural resource management: a synthesis and interpretation of identified effective approaches for managing the commons. Environmental Management 45:52–66.

Heathcote, I. W. 2009. Integrated watershed management: principals and practice. 2nd edition. John Wiley and Sons, Hoboken, New Jersey.

Hillman, T., L. Crase, B. Furze, J. Ananda, and D. Mayberry. 2005. Multidisciplinary approaches to natural resource management. Hydrobiologia 522:99–108.

Isely, E. S., R. Denning, and P. Isely. 2012. Applying the INtegrated Valuation of Ecosystem Services Tool (INVEST) at the parcel level: the Owasippe Scout Reservation demonstration project. Final Project Report for the West Michigan Strategic Alliance and The Nature Conservancy. West Michigan Strategic Alliance, Grand Rapids, Michigan.

Isely, E. S., P. Isely, S. Seedang, K. Mulder, K. Thompson, and A. D. Steinman. 2010. Addressing the information gaps associated with valuing green infrastructure in west Michigan: INtegrated Valuation of Ecosystem Services Tool (INVEST). Journal of Great Lakes Research 36:448–457.

Kloprogge, P., and J. P. van der Sluijs. 2006. The inclusion of stakeholder knowledge and perspectives in integrated assessment of climate change. Climatic Change 75:359–389.

Koontz, T. M. 2003. The farmer, the planner, and the local citizen in the dell: how collaborative groups plan for farmland preservation. Landscape and Urban Planning 66:19–34.

Koontz, T. M., T. A. Steelman, J. Carmin, K. S. Korfmacher, C. Moseley, and C. W. Thomas. 2004. Collaborative environmental management: what roles for government? Resources for the Future, Washington, DC.

Leach, W. D., and N. W. Pelkey. 2001. Making watershed partnerships work: a review of the empirical literature. Journal of Water Resources Planning and Management 127:378–385.

Margerum, R. D. 2002. Collaborative planning: building consensus and building a distinct model for practice. Journal of Planning Education and Research 21:237–253.

Margerum, R. D. 2008. A typology of collaboration efforts in environmental management. Environmental Management 41: 487–500.

Moore, L. 2011. Owasippe, nation's oldest Boy Scout camp, celebrates 100th birthday. Mlive, July 22. (Available from: http://www.mlive.com/news/muskegon/index.ssf/2011/07/owasippe_nations_oldest_boy_sc.html)

Newham, L. T. H., A. J. Jakeman, and R. A. Letcher. 2007. Stakeholder participation in modeling for integrated catchment assessment and management: an Australian case study. International Journal of River Basin Management 5(2):79–91.

Parson, E. A. 1995. Integrated assessment and environmental policy-making. Energy Policy 23(4/5):463–475.

Prager, K. 2010. Local and regional partnerships in natural resource management: the challenge of bridging institutional levels. Environmental Management 46:711–724.

Sabatier, P. A., W. Focht, M. Lubell, Z. Trachtenberg, A. Vedlitz, and M. Matlock. 2005. Swimming upstream: collaborative approaches to watershed management. Massachusetts Institute of Technology Press, Cambridge, Massachusetts.

Scavia, D., and S. B. Bricker. 2006. Coastal eutrophication assessment in the United States. Biogeochemistry 79:187–208.

Schlumpf, C., C. Pahl-Wostl, A. Schönborn, C. C. Jaeger, and D. Imboden. 2001. Impacts: an information tool for citizens to assess impacts of climate change from a regional perspective. Climatic Change 51:199–241.

Selin, S., and D. Chavez. 1995. Developing a collaborative model for environmental planning and management. Environmental Management 19:189–195.

Sevenant, M., and M. Antrop. 2010. Transdisciplinary landscape planning: does the public have aspirations? Experiences from a case study in Ghent (Flanders, Belgium). Land Use Policy 27:373–386.

Steinman, A. D., L. Nemeth, E. Nemeth, and R. Rediske. 2006. Factors influencing internal phosphorus loading in west-Michigan, drowned river mouth lake. Journal of the North American Benthological Society 25:304–312.

Steinman, A. D., J. R. Nicholas, P. Seelbach, J. Allan, and F. Ruswick. 2011. The role of science in developing policy for the use of groundwater in the state of Michigan. Water Policy 13:69–86.

Steinman, A. D., and M. E. Ogdahl. 2008. Ecological effects after an alum treatment in Spring Lake, Michigan. Journal of Environmental Quality 37:22–29.

Thompson, K., and B. Hansen. 2009. Shoreline Assessment Index Map for Spring Lake. Grand Valley State University, Annis Water Resources Institute, Muskegon, Michigan. (Available from: http://www.gvsu.edu/wri/director/rein-in-the-runoff-stormwater-integrated-assessment-in-spring-lake-project-products-28.htm)

US Census. 2000. Total population US census 2000. Blue Lake Township, Muskegon County, Michigan. US Census Bureau, Washington, DC. (Available from: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t)

US Census. 2010. Total population US census 2010: Blue Lake Township, Muskegon County, Michigan. US Census Bureau, Washington, DC. (Available from: http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t)

van Kerkhoff, L., and L. Lebel. 2006. Linking knowledge and action for sustainable development. Annual Review of Environmental Resources 31:445–477.

Versluis, A. 2000. Island farm. Michigan State University Press, East Lansing, Michigan.

Walz, A., C. Lardelli, H. Behrendt, A. Gret-Regamey, C. Lundstrom, S. Kytzia, and P. Bebi. 2007. Participatory scenario analysis for integrated regional modeling. Landscape and Urban Planning 81:114–131.

Yosie, F. T., and T. D. Herbst. 1998. Using stakeholder processes in environmental decision-making: an evaluation of lessons learned, key issues and future challenges. Ruder Finn Washington, ICF Incorporated, Washington, DC. (Available from: http://www.gdrc.org/decision/nr98ab01.pdf)