IOWA'S WATER

Ambient Monitoring Program

Social Dynamics of Water Quality

Human Values, Beliefs, Perceptions, and Understanding

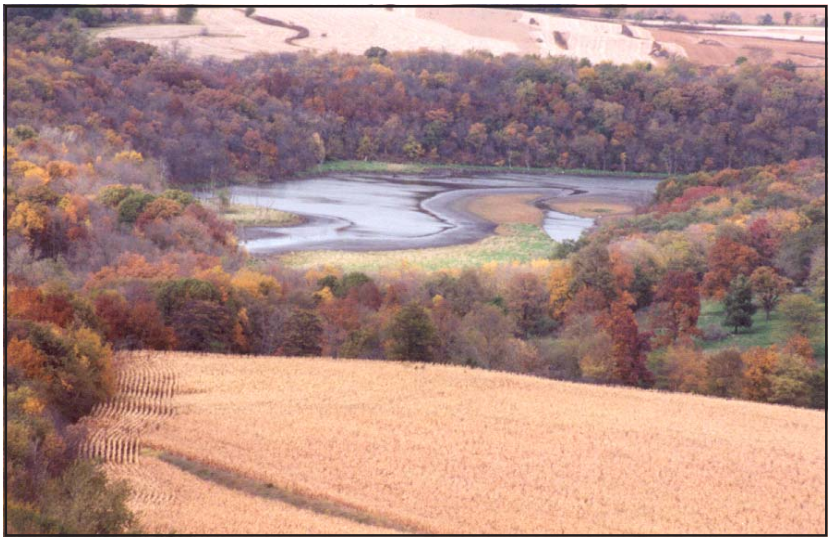
People determine how land is used and managed, and therefore whether water is polluted or protected. To maintain or enhance Iowa's water quality, we must understand and integrate both the physical and social dynamics of pollution. Residents, public officials, and technical specialists involved in a water quality project often view water quality issues differently. Their differences are grounded in the social dynamics present. Understanding these differences can affect the outcomes and implementation of water quality projects.

Figure 1. *Case study locations.*

Social Dynamics And Water Quality

The values and beliefs we hold affect our perceptions of and impact on the environment. For example, landowners are unlikely to support water quality enhancement alternatives that disrupt their existing values and beliefs regarding the land and their activities. Unless differing value systems are respected and acknowledged, conflict over alternative solutions is likely.

Water quality specialists and residents usually understand technical aspects differently because of their differing perceptions and beliefs. For example, local residents may be concerned about excess nitrate or bacteria in their drinking water because of the direct threat to their health, but may be less concerned about excess levels of phosphorus because health effects are indirect. Water quality experts, however, would likely be quite concerned about excess phosphorus in surface water because they understand the environmental damage caused by eutrophication, or nutrient enrichment. In this circumstance, residents could be ex-



Cedar Lake, Madison County.

pected to support measures to limit nitrate and bacteria levels in surface water while not widely supporting additional measures to reduce phosphorus levels.

Social dynamics are complex. They affect the importance residents place on public water quality information, the extent to which they will participate in projects, and their willingness to change land use or management practices. Understanding these social dynamics prior to a water quality project allows planners to structure project participation, outreach, and data collection more effectively.

Case Studies

The following four case studies (Figure 1) represent water quality projects where social dynamics were investigated.

Squaw Creek Watershed (Hamilton, Boone, and Story counties, 2002). The social dynamics of Squaw Creek Watershed were studied to assist local partners in the Squaw Creek Watershed in structuring future local awareness efforts. Many residents (56% of project participants) defined the scope and use of the term "water quality problems" differently from water quality specialists. Participants most commonly related this term to the quality of their own drinking water supplies and health. Local specialists, however, extend their use of the term beyond humans and relate it to the broad set of physical, chemical, and biological characteristics of both surface and groundwater. Because of their interpretation of the term, residents indicated that they would likely disregard media attention to the term "water quality problems," because they perceive the quality of their drinking water to be very good. Project leaders can then assume that general use of this term with the public will not effectively communicate their meaning.

Although local water quality specialists were very concerned about water quality conditions in the watershed, resident responses to questions of conditions ranged from excellent to poor. For example, participants cited that water in the stream is adequate (or not harmful) to wildlife but not okay for human consumption, as proof that water quality is both good and impaired. This difference in perception among residents is grounded in their expectations of how water in the stream should function. These perceptions of quality impact the importance they place in water quality enhancement efforts.

Clear Lake, Cerro Gordo County.

Clear Lake (Cerro Gordo County, 2001). Iowa scientists and local volunteers conducted a two-year water quality study of Clear Lake and its watershed. Water quality specialists working on the Clear Lake restoration plan had several options for reducing turbidity. They were particularly interested in attenuating winds by the construction of linear islands in the lake with tree plantings. Residents participating in this study indicated a strong emotional relationship with the lake largely based on its appearance in the landscape. This strong connection to the lake would likely have caused strong public opposition to any options that altered its visual appearance. Based on this information, water quality specialists were able to propose options that were compatible with local values.

Cedar Lake (Madison County, 2001). Although Cedar Lake's watershed lies predominantly outside Winterset's political jurisdiction, the lake serves as the city's drinking water supply. High spring and summer levels of nitrate have been an issue in the lake since 1998. Water quality specialists identified agricultural operations in the watershed as the primary source of excess nitrate in lake water. At the time of this research, the Madison County Soil and Water Conservation District, the City of Winterset, and the Iowa Dept. of Natural Resources were beginning to collaborate to reduce nitrate levels in the lake. Only half of farmer participants in this research believed that agricultural land use and management are responsible for the impaired water in Cedar Lake. Farmers described their extensive use of conservation practices as evidence to support this belief. Use of tile-drained terraces, for example, is common in this part of Iowa. Farmers explained their belief that this practice is good for lake water quality because it reduces sediment reaching the lake from terraced fields. While water quality specialists would likely agree that less sediment reaches the lake from terraces that are tile-drained, they also understand that drainage from agricultural tile lines is often heavily laden with nitrate that is directly discharged into streams and lakes with little opportunity for filtering and nitrate removal. To achieve project objectives, project staff raised awareness about the complexity of water quality impairment—that a conservation practice can both reduce one type of impact, such as sediment delivery, while intensifying another—in this case nitrate loss.

Briggs Woods Lake (Hamilton County, 2001). Briggs Woods is a county park that provides numerous recreational opportunities. The lake has a history of high nutrient levels, sedimentation, and elevated bacteria at the beach. Research in this watershed sought to assess current social dynamics relative to lake pollution several years after completion of

Headwaters of Squaw Creek, Hamilton County.

a watershed education and awareness project. Farmers on the Briggs Woods watershed council had a much higher technical understanding of their local pollution when compared with their peers in the Squaw Creek and Cedar Lake watersheds. Their understanding of the pollution sources, pathways into the lake, and causes of pollution closely resembled those of water quality specialists working with them. This condition likely reflects the results of two years of locally intensive water quality activities in the watershed. Although this watershed continues to struggle with physical aspects of enhancing water quality in the lake, the social dynamics present among watershed council members support project objectives of water quality specialists.

Conclusions

These case studies characterized the range of values, beliefs, and perceptions present in watershed communities prior to the start of water quality enhancement efforts. Findings were then used to integrate physical and social change in the watershed in ways that are respectful of the uniqueness of each watershed—both the physical conditions and the people who live and work there. This social assessment methodology is under development and testing with Iowa watershed projects, and seeks to obtain focused social information using a fairly short amount of time, limited financial resources, and a relatively small number of participants.

Acknowledgements

Funding to develop and test this social assessment methodology was provided by Iowa Department of Natural Resources, U.S. EPA through Section 319 of the Clean Water Act, Leopold Center for Sustainable Agriculture, and Iowa State University Extension. Local technical support in the case study communities was provided by Story, Boone, and Hamilton County Soil and Water Conservation Districts, Madison County Soil and Water Conservation District, Winterset Municipal Utilities District, Jean Eells, and Loran Fletchall. John Downing, Nancy Grudens-Schuck, Terry Besser (all of Iowa State University), Dan Jaynes (USDA-ARS) and Ubbo Agena (Iowa DNR) provided technical assistance with content, methodology, and evaluation. This fact sheet was authored by Mimi Wagner.

Water Monitoring Program Web Site – wqm.igsb.uiowa.edu

Prepared by
Iowa Department of Natural Resources, Geological Survey
109 Trowbridge Hall, Iowa City, IA 52242-1319

Photos: Page 2 from The Madisonian; *pages 3 and 4 by Mimi Wagner.*