Photo by E.C. Stanley

Section 1: Assumptions and definitions of community watershed management

Citizen involvement in community watershed management doesn't just happen. Citizens must have opportunities to talk to others and learn about water issues. For them to act on water concerns, they must believe they can make a difference and have access to resources. In addition to sound science, technical support, and financial resources, they need to learn the process of working together as a group—as a watershed community. This manual is designed for community leaders, community development specialists, extension educators, and technical experts. It contains processes and resources for developing and supporting a community organization of citizens who want to learn about their watershed and partner with others to manage and protect it.

The problem

Iowa occupies less than 5 percent of the Mississippi River drainage basin. However, the state, on average, "supplies almost 25 percent of the nitrate-N that the Mississippi River delivers to the Gulf of Mexico" (Libra 1998:7). Other nonpoint source pollutants in Iowa's waters include sediment, excessive

Basic assumptions about community watershed management:

1. Citizen-based efforts can make a difference. The key to effective, high impact sustainable programs is local ownership of the process.

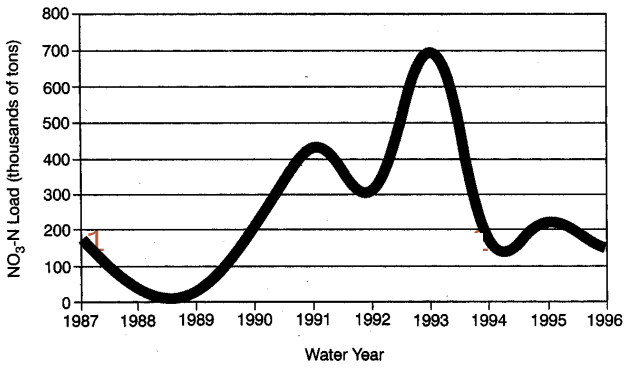
2. The exchange of information drawn from both science and local knowledge is an essential foundation for effective watershed management.

3. As citizens learn how to collect, evaluate, and integrate information, they are positioned to partner with others to protect their local lands and waters.

4. An organizational structure provides citizens a way to influence, modify, and support land use and water improvement practices.

5. Local efforts are successful when citizens, natural resource professionals, community development specialists, and community leaders act in partnership to address watershed issues.

phosphorous, synethic organic chemicals, and microorganisms.



Estimate of Iowa's Nitrate-Nitrogen Export to the Mississippi River

Source: Robert D. Libra. "Nitrate-Nitrogen: Iowa's Unintended Export." Iowa Geology 1998, Number 23. Iowa Department of Natural Resources.

Water pollution is not just a downstream problem that threatens Iowa landholders with new regulations. It is a local issue that affects the quality of life of everyone in Iowa. Streams and lakes provide habitat for fish and wildlife. Water assures agricultural productivity and economic opportunities for existing businesses to expand and new ones to relocate to the state. Iowa waters are sources of industrial and economic development, flood control, fishing, boating, swimming, and visual pleasure. Impaired waters threaten the social, physical, and economic well being of everyone.

Iowa has not ignored the problem of water quality. Private and public organizations and agencies have mobilized to understand the sources of pollution and to implement interventions. Farmers and other landowners have developed and adopted new land use practices to improve and protect water quality. Research and demonstration projects have proven the effectiveness and profitability of best management practices that reduce sediment runoff and excessive nitrates and phosphorous. Yet, the need to expand current projects for additional water quality protection continues.

Nonpoint source pollution is the cumulative result of everyone's land use practices. Pollution occurs in our activities of daily living: when used oil is poured on the ground or down the drain, when livestock wade in a stream, when a farmer or lawn owner applies too much fertilizer, when septic systems are inadequate, and when urban growth paves over land, thereby accelerating runoff.

The key to understanding and solving the problem is to get everyone involved.

One way to get everyone involved is to proactively initiate *community-led watershed management*. People who live in a watershed are the first line of defense against contaminated waters to reduce pollution. All the money and expertise in the world won't solve water problems until local watershed residents and landowners invest their time and energies in creating a new norm – a norm that values local streams, rivers, lakes, groundwater supply, and wetlands, and holds everyone accountable for actions that threaten this vital resource base of the community.

What's a watershed community?

A *watershed community* is a group of people who are bound together by the land that drains water into the physical flow of their common streams, rivers, lakes, or other bodies of water. A watershed community can be as small as the land basin (sub-watershed) and as large as people from multiple sub-watersheds are willing to undertake.

Water belongs to everyone. As a resource held in common, it is easy for no one to take responsibility for it. An engaged watershed community takes responsibility for understanding their land and water relationships and working with scientists to manage them in ways that benefit the whole community.

What is community watershed management?

Community watershed management means the people of the watershed invest their time, talents, energies, and personal resources in acquiring the knowledge they need to take an active role in managing their watershed. Watershed residents partner with elected officials, those with a financial stake in local lands, and natural resource experts to gather information and make decisions about local policies and land use practices that protect and add value to their land and waters. They frequently and systematically communicate with others within their watershed and connecting watersheds.

Maps of the Watershed

Most roadmaps show major water bodies of a region. However, smaller streams, rivers, and lakes are often not marked on transportation maps. Detailed topographic maps of the land and waters in a particular region are available from the U.S. Geological Survey. A map is usually named after the most prominent city, town, or natural landmark shown on it. State maps and smaller scale maps are available. Refer to Catalog of Topographic and Other Published Maps for names, dates, and prices.

Map Distribution
USGS Map Sales
Box 15286, Federal Center, Bldg. 810
Denver, CO 80225 — **or**
http://mac.usgs.gov/mac/findmaps.html

Iowa *topographic maps can be downloaded from the USDA NRCS site at Iowa State University:*

http://ortho.gis.iastate.edu/drg24/drg24.html

Community watershed groups can partner with Soil and Water Conservation District Commissioners, environmental groups, farmers, businesses, District Conservationists, natural resource professionals, and others to:

1. help establish communication networks with other watershed residents and groups,
2. educate and motivate others in the watershed to get involved,
3. initiate demonstration and field trials of best management practices,
4. collect local data such as water quality monitoring, wildlife inventories, resource inventories, and surveys of farmer and resident land use practices,
5. undertake watershed activities such as willow planting, trash clean-up, prairie and tree plantings,
6. identify priorities for allocating limited public financial resources,
7. set local water quality and quantity goals,
8. plan strategies for achieving goals,
9. offer innovative solutions for controlling potential water pollution, and
10. identify and seek additional funds to support local efforts to solve water quality problems.

A first step in developing a local watershed group is the convening of residents to discuss their water. Initially, they may not agree on the existence of water pollution in the community, sources of water contamination, or possible solutions. But, if they can agree on a meeting date, time, and place, they are off to a good start.

Sharing local knowledge

Watershed residents can begin to build local knowledge by discussing with each other what they already know about their watershed. This means they talk with each other about historical and current experiences – swimming, fishing, trapping, bird watching, irrigating, and drinking water. This local knowledge provides a foundation for thinking about their own personal and business practices that contribute to the quality of their water (see Figure 1). It should also lead to realizing there is a lot they don't know about their own watershed. This prepares them to ask questions and search for more information. The search for more information often leads to collecting expert and local knowledge. After sorting and evaluating the information, citizens are ready to frame watershed issues in their own language.

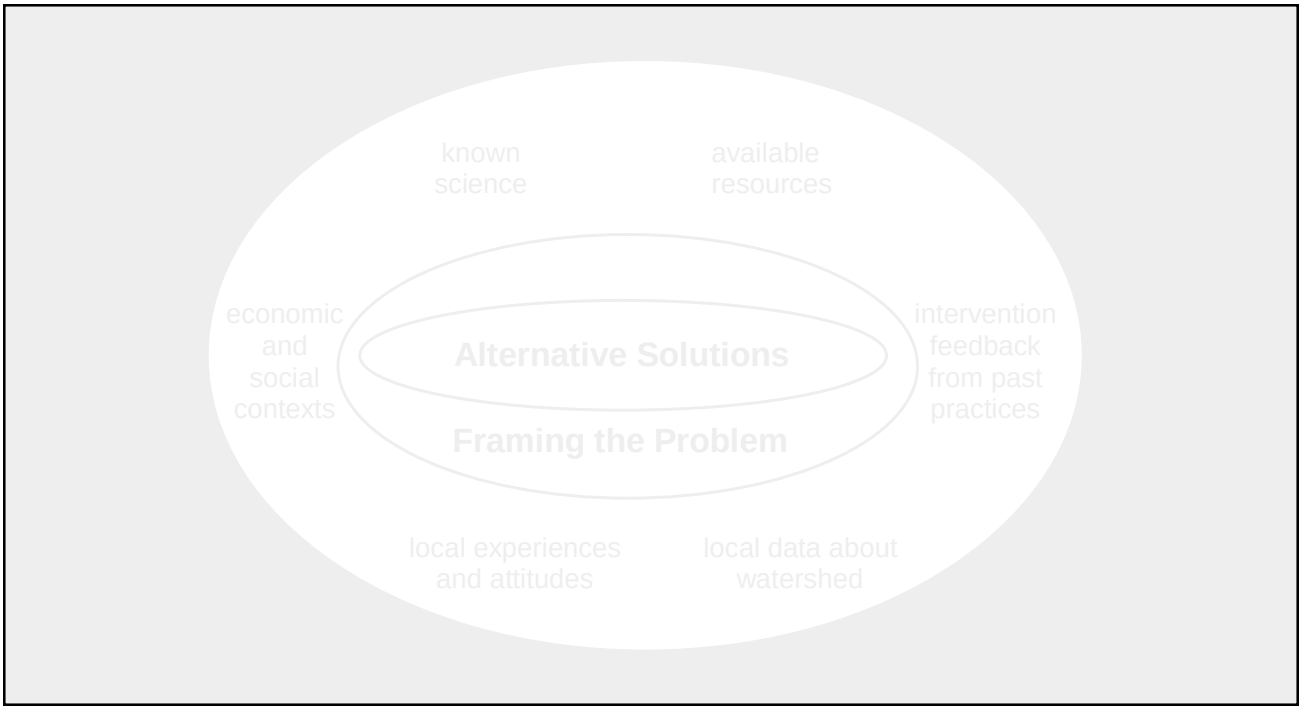


Figure 1. Inputs for developing alternative solutions

Then, as a local group forms, watershed residents are ready to begin as a group to talk about what needs to be done and what strategies are necessary to accomplish their goals.

Watershed groups are a diverse collection of people who have different reasons for wanting to better protect and manage their waters. They are farmers, rural landowners, business or retired people, students, teachers, sports enthusiasts, conservationists, and residents of rural and urban cities and towns. Some will be afraid that a federal or state agency will regulate the management of their lands and see a group effort as an opportunity to combat outside mandates. Others will be nature lovers, hunters, or environmentalists committed to conservation. Some will have had personal experience with illness or disease that they attribute to water quality issues. Some will be concerned about regional economic vitality and see clean water as an essential attribute for attracting and retaining businesses. Community watershed groups must deliberately create an open environment for all of these viewpoints to be voiced and seriously discussed.

Things to think about

- Local groups must understand their water problems and feel they can make a difference. Agencies which convene local groups must be prepared to let citizens make a difference.
- Communication among citizens and agencies supporting local groups must be as open and voluntary as possible.
- Local citizen priorities (as well as the resource system they are part of) are dynamic and will be constantly changing.
- Free exchanges of information and communication among citizens and natural resource experts is essential if they are to learn from each other and develop action strategies that make a difference.
- Local groups are always nested in other decision-making structures – within the county, region, state, and nation. Environmental, economic, social, and political decisions within and outside of the watershed influence what kinds of actions are possible.
- Reliance on government agencies alone to solve complex resource management problems may miss important water problems and solutions.
- A neutral third party facilitator is beneficial in the organizational formation of community watershed groups.
- Local citizen groups replace "educating" with "learning." People engage in change best when given an opportunity to co-create their environment.
- Conflict is inevitable when people feel strongly about their environment. The challenge is to redirect conflict and controversy to energize people to better manage and protect their water resources.

Notes to facilitator and community leaders:

1. Table 1 summarizes major pollutants, their sources, and water quality impacts.

2. Each watershed will have different water problems of concern to citizens: flooding, loss of fishing quality and implications for tourism, threats by EPA to regulate farm production practices, health impacts of inadequate septic systems, high bacteria counts and pesticides in drinking water, closed beaches and reduced water quantities due to drought or overuse.

   Some citizens will believe they do not have a problem because their stream or lake is not on the EPA 303(d) impaired waters list (*http:www.state.ia.us/dnr/organiza/epd/wtresrce/303dnotc.htm*). However, every watershed is at risk if citizens don't take proactive steps to prevent practices and policies that result in poor water quality and reduced quantity.

3. A glossary of watershed terms can be found at the back of this manual.

See Section 2 for a test of community readiness.

A community meeting small group report. *Photo by Peggy Murdoch*

Table 1. Some Nonpoint Source Pollutants, Their Sources, and Water Quality Impacts.

POLLUTANT	SOURCES	WATER QUALITY AND RELATED IMPACTS
sediment	agriculture crops & grazing forestry urban runoff construction mining	▪ decreases water clarity and light transmission through water, which: - causes a decrease in aquatic plant production - obscures sources of food, habitats, refuges, and nesting sites of fish - interferes with fish behaviors which rely on sight, such as mating activities ▪ adversely affects respiration of fish by clogging gills ▪ fills gravel spaces in stream bottoms, smothering fish eggs and juveniles ▪ inhibits feeding and respiration of macroinvertebrates, an important component of fish diets ▪ decreases dissolved oxygen concentration ▪ acts as a substrate for organic pollutants, including pesticides ▪ decreases recreational, commercial and aesthetic values of streams ▪ decreases quality of drinking water
pesticides **herbicides**	agriculture forestry urban runoff	▪ kill aquatic organisms that are not targets ▪ adversely affect reproduction, growth, respiration, and development in aquatic organisms ▪ reduce food supply and destroy habitat of aquatic species ▪ accumulate in tissues of plants, macroinvertebrates and fish ▪ some are carcinogenic (cause cancer), mutagenic (induce changes in genetic materials-(DNA), and/or teratogenic (cause birth defects) ▪ create health hazards for humans consuming contaminated fish or drinking water ▪ lower organisms' resistance and increase susceptibility to diseases and environmental stress ▪ decreases photosynthesis in aquatic plants ▪ reduces recreational and commercial activities
polychlorinated biphenyls (PCBs)	urban runoff landfills	▪ accumulate in tissues of plants, microinvertebrates and fish ▪ toxic to aquatic life ▪ adhere to sediments; persist in environment longer than most chlorinated compounds
polycyclic aromatic hydrocarbons (PAHS)	urban runoff	▪ accumulate in tissues of plants, macroinvertebrates and fish ▪ when disgested, create substances which are carcinogenic (cancer-causing) ▪ toxic to aquatic life ▪ toxicity is affected by salinity; estuaries with low salinities may be the most biologically sensitive
petroleum hydrocarbons	urban runoff	▪ water soluble components can be toxic to aquatic life ▪ portions may adhere to organic matter and be deposited in sediment ▪ may adversely affect biological functions

Table 1. Some Nonpoint Source Pollutants, Their Sources, and Water Quality Impacts, continued.

POLLUTANT	SOURCES	WATER QUALITY AND RELATED IMPACTS
pathogens and fecal bacteria	agriculture forestry urban runoff	▪ create human health hazard ▪ increase costs of treating drinking water ▪ reduce recreational value
nutrients (phosphorus, nitrogen)	agriculture forestry urban runoff construction	▪ overstimulate growth of algae and aquatic plants, which later, through their decay, cause: - reduced oxygen levels that adversely affect fish and other aquatic organisms - turbid conditions that eliminate habitat and food sources for aquatic organisms - reduced recreational opportunities - reduced water quality and increased costs of treatment - a decline in sensitive fish species and an over-abundance of nutrient-tolerant fish species, decreasing overall diversity of the fish community - premature aging of streams, lakes, & estuaries ▪ high concentrations of nitrates can cause health problems in infants
metals	urban runoff industrial runoff mining automobile use	▪ adversely affect reproduction rates and life spans of aquatic organisms ▪ adversely disrupt food chain in aquatic environments ▪ accumulate in bottom sediments, posing risks to bottom feeding organisms ▪ accumulate in tissues of plants, macroinvertebrates, and fish ▪ reduce water quality
sulfates	mining industrial runoff	▪ lower pH (increase acidity) in streams which stresses aquatic life and leaches toxic metals out of sediment and rocks ▪ high acidity and concentrations of heavy metals can be fatal to aquatic organisms, may eliminate entire aquatic communities
radionuclides	mining and ore processing nuclear power-plant fuel & wastes commercial/ industry	▪ release radioactive substances into streams ▪ some are toxic, carcinogenic (cancer causing) and mutagenic (induce change in genetic materials-DNA) ▪ some break down into “daughter” products, such as radium and lead, which are toxic and carcinogenic to aquatic organisms ▪ some persist in the environment for thousands of years and continue to emit radiation ▪ accumulate in tissues, bones and organs where they can continue to emit radiation
salts	agriculture mining urban runoff	▪ eliminate salt intolerant species, decreasing diversity ▪ can fluctuate in concentration, adversely affecting both tolerant and intolerant species ▪ impact stream habitats and plants which are food sources for macroinvertebrates ▪ reduce crop yield ▪ decrease quality of drinking water ▪ reduce recreation values through high salinity levels and high evaporation rates