

# **Education Technical Work Team Report**

## **Minnesota Water Sustainability Framework January 2011**

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## **A. Key Findings**

- The role of education is undervalued in protecting water resources.
- Education is often an "add-on" and the first to be eliminated when resources are reduced.
- The diversity of Minnesota's citizens requires tailored messages and tailored methods of delivery.
- Minnesota has many components of a comprehensive water education system, yet lacks an overall strategy or systematic approach.
- Professional training curriculums in land use planning, engineering, horticulture, agriculture, etc., need more water resources content.
- There are many skilled and dedicated water resource educators and many excellent resources in the state, but their use is hampered by a lack of communication among providers and coordination on resources.
- No clear system links formal and non-formal, youth and adult water education.
- Two key messages for all Minnesotans are that there is a strong connection between individual and corporate actions on the land, and that water is important to all living things and to our economic well-being.

## **B. Introduction**

Full protection of water resources and long-term sustainability in Minnesota can only be achieved if we have a broad understanding of the issues and what it takes to make the resources sustainable, and if various audiences have correct information in the correct format. Education can take many forms, both formal and non-formal, for different age groups, cultural groups, and roles (e.g., citizen, water specialist, urban runoff, rural runoff).

The education technical work team charge was: "Develop a short white paper on water education in Minnesota for presentation to the Headwaters Council. The paper should include: What has been accomplished in terms of water education; gaps or issues that have not been addressed; and a statement of issues to be addressed in the Minnesota Water Sustainability Framework. The white paper is not a set of recommendations. It sets up the issues that may be addressed by recommendations."

Team members (Appendix A) were selected using the following criteria: represent different elements of the environmental education network, understand the specific needs to water, represent different parts of the state, and provide education or are connected to different audiences. The team met five times to discuss needs, gaps, and issues. It went through brainstorming, a certain level of benchmarking, and general discussion. In order to frame the discussion, the team established goals for education on water issues, then completed a strengths, weaknesses, opportunities, and threats (SWOT) analysis for each goal, from which it derived the key issues. Please see Appendix B for the team SWOT analysis.

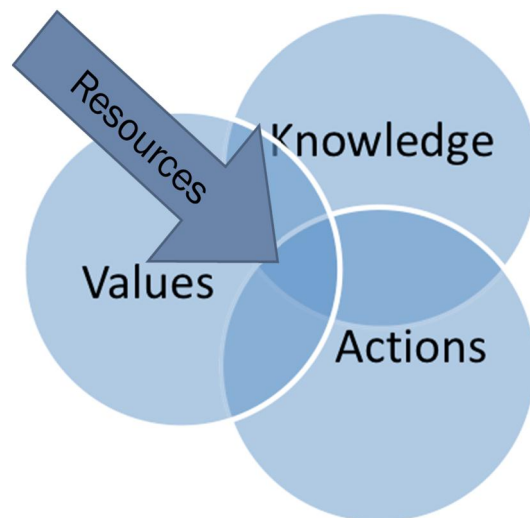
Early in the process the team began to research all the resources, methods, audiences, etc., for Minnesota water education, but quickly concluded that this exercise was beyond its resources and time limits. Appendix C lists some of the key resources, but the list is in no way exhaustive.

### C. Background

Education about water takes many forms and reaches many different groups throughout Minnesota. Our extensive water resources give citizens, organizations, businesses, and governmental units direct interaction with water, whether they live, work, and play near Lake Superior, in the Southwest, along the Mississippi River, in the Red River Valley, or in the Twin Cities metropolitan area. Polling often indicates that Minnesotans value their water resources (League of Women Voters 2000, College of St. Catherine, 2008). However, valuing water resources can take many forms and mean different things to different people. For example, a family that has spent summers at a cabin up north will value water much differently than new immigrants fleeing persecution who have lived where they had to walk several miles each day for water, or a family living on the Leech Lake reservation for whom water not only provides sustenance, but has a significant spiritual meaning. Valuing water resources also does not necessarily mean that citizens understand the resource, the connection between land use and water quality or quantity, or what they can do to protect water resources.

The team worked from a model that included three components: knowledge, values, and action (figure 1). Historically, moving from one to another was thought to be a linear process for individuals and organizations. However, it is now believed that these components may not all be necessary, that for each person the impact and importance of each may vary, and that this is not yet fully understood (Manning 2009).

Figure 1. Water education includes knowledge, values, and action.



The team decided to include all three components, which comprise the area of civic engagement. While not a comprehensive analysis of civic engagement, we felt it important to ensure that this human dimension component be raised as an issue for the framework.

Education is an essential element of every tool we have to protect water resources: monitoring, assessment, implementation, regulation, protection, and evaluation. In order to be most effective, it must be supported and strategically integrated into every program we have to protect and manage water resources.

The scope of our work was very broad in terms of methods and audiences. Team members represented both formal and non-formal education. Formal education was defined as within a school curriculum (K-12, post-high school). Non-formal education takes many forms: on-the-job training; citizen education through local, state, and federal government and nongovernment organizations; professional training through workshops and conferences, etc.

#### **D. Goals/Issues**

The team used goals for water education to help frame the issues; for each goal, we developed issue statements with a brief explanation. As the team worked through its SWOT analysis, it was clear that the gaps and needs were the issues. Thus we have incorporated gaps and needs into the issues statements under each educational goal.

##### **1. Goal 1: Knowledge**

- a. Minnesotans will understand our water resources—where water comes from and where it goes.** Knowledge helps us think critically about water and forms the basis for supporting sustainable water resources. Minnesotans value their water resources, but do not always understand the impacts of their actions on water quality and water quantity. The recent vote on the Clean Water, Land and Legacy Amendment to the Minnesota Constitution shows that people understand that water is important, but don't always understand the basic mechanisms, issues, or ways in which they impact water. A team member reported that some citizens who are not actively engaged in water resources protection and improvement said they voted with for the amendment because protecting water is a good thing, but then went on to admit they really did not understand the issues or even why there was a need for more funds. Because our society often engages people with sound bites, the two key messages that are deemed important for all Minnesotans are that there is a strong connection between individual and corporate actions on the land, and that water is important to all living things and to our economic well-being.
- b. Issues.** We identified four issues relating to goal 1:
  - (1) ***Water benefits all life and should not be separated into natural and human systems.*** Water issues are complex, and water solutions are complex. Water education sometimes focuses on one of the two systems—natural or

humanô with the focus more often on the importance of water for humans now and into future generations. However, humans are part of a larger ecosystem, and as ecosystems are upset by humans or other forces, the impacts are to all living beings. It is important to deliver a more integrated message in order for Minnesotans to fully understand the basics of our water resources.

- (2) ***Education delivery systems are not keyed to the diversity of the state's residents.*** Minnesota's population continues to diversify, yet water education messages for the most part remain "one size fits all." Individual learning styles vary and are influenced by experience, culture, interaction with water as youth, and location. To be truly effective, there have to be multiple methods of crafting and delivering messages. Think of the difference in messages for just a few audiences:

- New immigrants fleeing persecution are exposed for the first time to water and wastewater systems in their homes.
- Youth growing up on a farm have grown up with concerns over the timing and quantity of precipitation with respect to their family's livelihoodô the crops in the field.
- Youth raised on a reservation incorporate water fully into their spiritual beliefs.
- Some populations rely on elders for delivery of knowledge.
- A child raised in the city may be in a family that has never visited a nearby lake or stream.

Minnesota is changing, and to be effective, knowledge must be crafted in messages specific to particular groups and delivered in a targeted manner.

- (3) ***Water education requires teaching skills as well as content to be effective.*** There are two sides to this coin, both of which are very important. Often with adult education (and some youth education), scientists who are content experts are thrust in the role of educator, and they deliver content but don't truly educate. They lack teaching skills and concepts. Likewise, many K-12 teachers are excellent teachers but are not steeped in water concepts, and so are not as confident in delivering these messages. The default has typically been to rely on the water scientist to educate with little regard for the teaching expertise.
- (4) ***Minnesota lacks clear leadership for environmental and water education.*** While many local and state agencies provide water education, there is no clear leader to help define and coordinate a more coordinated message or system. As agencies shrink resources for water education, there is a decreased emphasis on the importance of water education and decreased impetus to provide direction and coordination.

## 2. *Goal 2: Values*

Minnesotans will hold values, attitudes, and norms that:

- Support sustainable actions to maintain our common water resources and ecological system supported by those resources
  - Allow future generations to enjoy clean and plentiful water
- a. **Water is important to Minnesotans.** We often conclude this from our own point of view, from a general poll, or from actions. However, if we dive beneath the surface, we find that this value may be very different for individuals. In addition, the experience of the current adult population with water resources may be very different than the experience of our diversifying youth population.
- b. **Issues.** We identified four issues relating to goal 2:
- (1) ***Minnesotans take water for granted.*** The downside to Minnesota's bounty of water resources is that Minnesotans can fail to appreciate how precious the water resources really are and that they could be threatened if we do not care for them now. From an economic point of view, we place very little value on water. We do not charge the real costs for using or polluting it. This undermines the educational message and the importance of truly valuing our water resources.
  - (2) ***Youth are spending less time outdoors, which is a place to learn environmental values.*** Youth experiences are critical to forming values that carry throughout adulthood. The "no child left inside" movement has identified multiple facets of this issue in addition to valuing natural resources (increase in childhood obesity, rise in attention deficit disorder, etc.). Agencies and organizations such as the Minnesota Department of Natural Resources are working to encourage outdoor activity through environmental education programs. However, this is not enough. As a society, we must take this seriously if we are to create future adults who will care for their water resources.
  - (3) ***Barriers to adopting values, attitudes, and norms about water resources are complex and poorly understood, and vary with the audience.*** Educators are often seen as experts not only in knowledge, but also in how people adopt values, behaviors, and norms. However, this is a separate expertise of the sociology and psychology professions. To truly be successful, we need to increase engagement of behavioral scientists in work with educators.
  - (4) ***Water is not always linked as it should be to other environmental norms or behaviors (e.g., recycling, conservation).*** Society is undergoing some very

successful changes in values and norms that could serve as building blocks for norms related to water resources protection. For example, in the past 20 years recycling has become a norm in our state. While the mechanisms for developing the norms may be different, we should learn about and build on these other norms and values.

### 3. **Goal 3: Actions**

- a. **All Minnesotans will make daily decisions and take actions at home, work, and play that will sustain the quantity and quality of the state's water resources for the long term.** Protecting and restoring our water resources has historically been viewed as the purview of experts. We must continue to change this model so all Minnesotans see this as their responsibility in all areas of their life.
- b. **Issues.** We identified three issues relating to goal 3:
  - (1) ***People don't think their individual actions matter.*** It is difficult for any of us to truly believe that we can make a difference. As a result, individuals may not adopt positive practices regarding water resources and may continue to act in ways that are harmful to water resources.
  - (2) ***It is difficult to persuade people to change behavior to benefit water resources.*** Behavior change is a very complex issue. Unfortunately, there are no easy answers. Educators acknowledge they are experts in education, but not in behavior change. To educate in a manner that leads to action, information from behavioral scientists will be key. *The Psychology of Sustainable Behavior* (Manning 2009) provides the sort of information that could be valuable to educators. It also highlights the importance of engaging behavioral scientists in water resources.
  - (3) ***We don't consider (or even know) the indirect and cumulative costs of actions affecting land and water, such as loss of resource, pollution, and clean-up.***

### 4. **Goal 4: Resources**

- a. Minnesotans will support education as a foundation for water management so both formal and non-formal activities receive sufficient funding and support. The role of education is undervalued in protecting water resources, resulting in a lack of leadership and lack of resources for education. There is no clear framework for water education. Resources such as *A GreenPrint for Minnesota: State Plan for Environmental Education, Third Edition* (MPCA 2008) could provide this. Environmental education is still viewed as an "add-on," so is often the first to be cut when resources are tight. While new resources will be limited, we must be

more strategic about using existing resources for water education, try to prevent erosion of these resources, and set clear performance expectations and standards for water resources education. There are many skilled and dedicated water resource educators in the state, but utilization is often hampered by lack of a framework that incorporates formal, non-formal, adult, and youth education.

**b. Issues.** We identified four issues relating to goal 4:

- (1) ***Inconsistent funding has multiple consequences.*** Funding for environmental education is often short term and driven by grants rather than permanent funding. Even when there is permanent funding, it is often the first to be eliminated. The lack of permanent stable funding results in a shotgun approach, spotty exposure, and a fragmented system of education on water issues. The result is that we resort to broad-brush approaches and messages because we don't have adequate resources to develop more targeted messages. We miss many critical audiences or approach them in a way that has no meaning to them. Because resources will not be increasing in the near future, we need to take advantage of opportunities such as professional development.
- (2) ***Professional training in education is rarely included in regulatory requirements, even when education is part of the requirement.*** Opportunities for additional education through partnerships and with regulatory programs are not maximized. This will become increasingly important in a time of shrinking resources for both the regulatory programs and the educational programs. For example, some permits require an education component, but offer no training or direction for the permittees on providing the education. The assumption is often that training on technical issues is critical, but training on educating effectively is not critical, or even considered.
- (3) ***In the system of water management, regulation typically trumps education. However, regulation can only go so far, and a more sustainable approach would include education.*** Regulation has been the default answer for so many years in improving the state's water resources. Regulation is an important and effective tool, but alone will never move us where we need to be. Education is often an add-on, but effective education is more sustainable and ultimately can reduce the number of resources needed for regulation and legal action.
- (4) ***Educational programs need to allow for continual updating and changing due to changing demographics, new technology, new science or understanding, emerging issues, and new partnerships.*** Any educational system on water resources must be nimble and flexible because society is changing rapidly. Today's message, methods, and audiences are not the same



as those of five years ago, and change will continue at an accelerating pace. Five years ago we did not anticipate podcasts, the iPad, the dynamics of social networking, and other new methods for getting their information. Systems must be able to adapt quickly to remain relevant.

## E. References

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## **Appendix A. Education Technical Work Team Members**

**Faye Sleeper** (co-chair), co-director, Water Resources Center, University of Minnesota, St. Paul

**Barb Huberty** (co-chair), citizen volunteer

**Jean Coleman** (coordinator), attorney/land use planner, CR Planning, Inc., Minneapolis

**Felicia Brockoff**, administrative assistant, Carver SWCD, Cologne

**Meghan Cavalier**, executive director, Rivers Edge Academy, St. Paul

**Karen Lee Davis**, outdoor education supervisor, Three Rivers Park District; Coon Rapids Dam Visitor Center and Kroening Interpretive Center

**Tracy Fredin**, director, CGEE, and assistant professor, School of Education, Hamline University, Center for Global Environmental Education and WaterShed Partners, St. Paul

**Cindy Hagley**, extension professor, Minnesota Sea Grant, Duluth

**Linda Kingery**, executive director, University of Minnesota, Regional Sustainable Partnerships, Crookston

**Courtney Kowalczak**, program director, Minnesota Waters, Duluth

**David Fulton**, assistant unit leader wildlife, U.S. Geological Survey, Cooperative Research Unit, St. Paul

**Molly MacGregor**, principal planner, MPCA, Detroit Lakes

**April Rust**, Project WET coordinator, DNR Waters, St. Paul

**Molly Schulz**, public affairs director, Conservation Minnesota, Minneapolis

**Ron Struss**, pesticide best management coordinator, MDA, St. Paul

**Lyndon Torstenson**, manager, educational partnerships, National Park Service, Mississippi National River & Recreation Area, St. Paul

**Jenny Winkelman**, education and outreach manager, Mississippi Watershed Management Organization, Minneapolis

**Appendix B. Results of SWOT Analysis**

<p><b>Goal Statement 1:</b> All Minnesotans will understand basic information about our state's water resources, including ecological systems, [values] services and functions, watersheds and how water quality and quantity are interconnected with the very ways they use that land and water, and where the water they use comes from and where it goes. This information is essential to thinking critically about water, and forms the knowledge basis for promoting stewardship of sustainable water resources in our state.</p>	
<p><b>Strengths</b> (what we know)</p>	<ul style="list-style-type: none"> <li>• Many Minnesotans have an understanding of water resources through where they live (near water), their livelihood, and their recreation.</li> <li>• The value and importance that many Minnesotans give to water resources make them receptive to learning more about them. Water is very much a part of many Minnesotans' lives.</li> <li>• Minnesota K-12 academic scientific standards support students in developing a basic understanding of water resources (I think . . .).</li> <li>• There are many providers of non-formal education on water resources in Minnesota, including, but not limited to, watershed organizations, nature centers and museums, city and county government, state agencies, University of Minnesota Extension, federal agencies, businesses, interest and advocacy groups, etc.</li> <li>• The 2007 Minnesota Report Card on Environmental Literacy (<a href="http://www.seek.state.mn.us/eemn_b.cfm">www.seek.state.mn.us/eemn_b.cfm</a>) show Minnesotans scoring 61% correct on nonpoint source knowledge questions and 63% correct on wetland knowledge questions. Knowledge on these questions increased between 2001 and 2007.</li> <li>• The relationships that tie people, land, and water together are complex.</li> <li>• Decisions are typically driven by short-term economic considerations—agricultural productivity, flood protection for a community, adequate supply to meet needs of growing population—without a full accounting of the ecological values.</li> <li>• Good resources exist to provide this basic information.</li> <li>• Scope and sequence concepts give us good scaffold structures for how to build this knowledge.</li> <li>• This level of comprehensive statewide knowledge could provide the rationale for sound water resources decision making.</li> <li>• This goal will engage those citizens who do care about Minnesota's water and would make changes in their behaviors to improve water resources if they knew their current actions caused harm and what steps they can take to change that harm.</li> <li>• Easier to measure change than other goals via surveys.</li> </ul>

<p><b>Weaknesses</b> (what we don't know)</p>	<ul style="list-style-type: none"> <li>• As Minnesota's population becomes more urbanized and jobs become more technical, Minnesotans' understanding of an interest in water resources is diminishing (I don't have data on this).</li> <li>• Some concepts, such as "watershed," are abstract and hard to grasp and appreciate (I think teaching about watersheds per se is often inadvisable).</li> <li>• As schools focus on basic educational goals (reading, math), opportunities to teach on water resources diminish.</li> <li>• Reductions in budgets have decreased the ability of some non-formal educators in delivering water resource education programs (I don't have data on this).</li> <li>• The 2007 Minnesota Report Cards on Environmental Literacy (<a href="http://www.seek.state.mn.us/eemn_b.cfm">http://www.seek.state.mn.us/eemn_b.cfm</a>) had Minnesotans scoring 39% incorrect on nonpoint source knowledge questions and 37% incorrect on wetland knowledge questions. When misguided actions of a few can negate the positive water resource protection actions of many, it is important to increase current knowledge levels.</li> <li>• Not all Minnesotans speak English or are familiar with Minnesota history and culture.</li> <li>• We often fail to understand the nonlinear response of water systems to the stresses we as humans impose. Or more accurately, we fail to understand the thresholds or tipping points as we continue to add stressors.</li> <li>• Such information is provided rather haphazardly.</li> <li>• Many people perceive that other issues are more important to them, and do not seek such information.</li> <li>• We don't have a widely recognized or utilized list of what is "basic water resource information."</li> <li>• Will there be a marketing and education budget to achieve this goal?</li> </ul>
<p><b>Opportunities</b> (gaps analysis)</p>	<ul style="list-style-type: none"> <li>• The "Environment as an Integrating Context" (EIC) approach shows how basic educational goals can be reached by using the local environment as an educational tool (<a href="http://www.seer.org">http://www.seer.org</a>).</li> <li>• Minnesotans can be reached with water resources educational messages through how they recreate and play (state parks, museums, etc.).</li> <li>• Social networking and other communication tools are now available for sharing messages.</li> <li>• Passing the referendum on environmental and arts funding will make new resources available for water resources.</li> <li>• Oprah!</li> <li>• Most people have woefully incomplete basic water knowledge; they may be missing large pieces of this information (such as knowing where their water comes from and where it goes).</li> <li>• All Minnesotans attend school in childhood, where water education can happen comprehensively.</li> <li>• Adults can be provided information in settings they encounter for fun (where they are more receptive) such as the state fair.</li> </ul>

	<ul style="list-style-type: none"> <li>• Create list of basic water resource information.</li> <li>• Can track somewhat with new versions of Minnesota Report Card of Environmental Literacy (especially the water-focused questions).</li> <li>• General citizen support for clean, abundant water resources is demonstrated by voting in the clean water amendment.</li> </ul>
<p><b>Threats</b> (issues)</p>	<ul style="list-style-type: none"> <li>• The crowded classroom; teachers are being asked to educate on more and more topics while at the same time being asked to give extra focus to the basics.</li> <li>• The crowded head; people can be overwhelmed with messages about the environment, health, child rearing, social awareness, money management, etc. Water resource education messages need to compete with others messages in the world of ideas.</li> <li>• The crowded life; some people are too overwhelmed with the requirements of daily living (getting to work, taking care of children/parents, meal preparation, housework, personal finance, etc.) to have time to focus on environmental messages.</li> <li>• Water resources educational messages are not universally accepted; there is still debate academically and on the street about what is needed to protect water resources (similar to, but not as pronounced, as the debate on climate change). Differences can be amplified if financial losses or gains are involved.</li> <li>• Mixed messages confuse decision makers and public, e.g., infiltrating stormwater is good for protecting surface water, but could threaten groundwater.</li> <li>• Cumulative impact of conversion of perennial cover to urban and agricultural development impacts hydrology. Impact across all scales of human/landscape intervention.</li> <li>• Climate change regional differences with warmer, drier conditions anticipated south and warmer, wetter conditions anticipated north.</li> <li>• Adults making decisions without this basic information about water leave Minnesota in a precarious position.</li> <li>• Even if this goal is met, it may not be enough to change attitudes or behaviors with citizens.</li> <li>• Some citizens will not be responsive to learning the information.</li> </ul>

**Summary of Issues:**

Communicating basic water information to children and adults has major gaps

**Goal Statement 2:** Because knowledge by itself is not enough to promote stewardship, Minnesotans will hold values, attitudes, and norms that support sustainable actions to maintain our common water resources and ecological systems supported by those resources, allowing future generations to enjoy clean and plentiful water.

<p><b>Strengths</b> (what we know)</p>	<ul style="list-style-type: none"> <li>• Many Minnesotans have a “connection” with water resources through where they live (near water), their livelihood, and their recreation.</li> <li>• Being the “Land of 10,000 Lakes,” water is something Minnesotans find common identity with – it defines us as Minnesotans.</li> <li>• Many Minnesotans derive their livelihoods from clean, plentiful water (tourism, recreation, agriculture, processing, etc.). Clean and plentiful water protects the property value of those with recreational property.</li> <li>• Working for the common good is a social norm in Minnesota.</li> <li>• In the 2007 Minnesota Report Card on Environmental Literacy (<a href="http://www.seek.state.mn.us/eemn_b.cfm">www.seek.state.mn.us/eemn_b.cfm</a>), 66% of respondents said laws protecting water quality had “not gone far enough” and 27% said they were “about right,” indicating an attitude supportive of protecting water.</li> <li>• The affluence of many Minnesotans allows them to have time and resources to give attention to environmental protection.</li> <li>• Values are formed through experience.</li> <li>• Values and attitudes only partially predict behavior.</li> <li>• We do know that this is just as critical as knowledge, if not more so.</li> <li>• Developing values, attitudes, and norms is a function of relevant foundational experiences in childhood.</li> <li>• Acknowledges that knowledge isn’t enough to make change.</li> <li>• Builds infrastructure for changing attitudes and norms to support water sustainability.</li> </ul>
<p><b>Weaknesses</b> (what we don’t know)</p>	<ul style="list-style-type: none"> <li>• As Minnesota’s population becomes more urbanized and jobs become more technical, some Minnesotans’ connection with water resources is diminishing (I don’t have data on this).</li> <li>• “Crowded,” busy, and underfinanced lives diminish the propensity of some to take an interest and concern in the environment.</li> <li>• How to build social norms that support healthy waterways.</li> <li>• It is less clear just what those developmental experiences should be, and conducting/providing such experiences is more in the realm of subjective art than science.</li> <li>• Will there be a marketing and education budget to achieve this goal?</li> <li>• Will there be support to fulfill this goal, education plan, and whole water sustainability framework plan?</li> </ul>
<p><b>Opportunities</b> (gaps analysis)</p>	<ul style="list-style-type: none"> <li>• Focus on service learning in the schools supports development of a stewardship attitude.</li> <li>• The current “care generation” (?) is showing more interest in building community, caring for others and the environment.</li> <li>• More children do not have foundational developmental experiences (to cultivate the goal’s values, attitudes, and norms) than do have them. Providing children with such experiences is a huge opportunity.</li> <li>• Can track somewhat with new versions of Minnesota Report Card on Environmental Literacy (especially the water-focused questions).</li> </ul>

	<ul style="list-style-type: none"> <li>• General citizen support for clean, abundant water resources is demonstrated by voting in the clean water amendment.</li> </ul>
<p><b>Threats</b> (issues)</p>	<ul style="list-style-type: none"> <li>• Potential of environmental protection of becoming uncool among young people, as seat belt use has.</li> <li>• Potential trend to doubt the expert may lead people to discount environmental messages and goals.</li> <li>• Potential of a slowing economy to deflect people's focus from the common good to the personal good.</li> <li>• Potential of care fatigue setting in.</li> <li>• Lack of demonstrated progress to clean water goals may undermine positive attitudes to taking and supporting action.</li> <li>• Competing values of economic gain and human control vs. ecological health and natural fluctuation.</li> <li>• Growing up in a world without outdoor contact in nature, and affinity with nature, is a threat to both positive human development and to water sustainability.</li> <li>• Working to change values and norms (especially by government) is often viewed negatively.</li> <li>• Changing values and norms is extremely hard and expensive to do.</li> <li>• Education staff doesn't always have the skills and experience to plan value-change campaigns.</li> </ul>

**Summary of Issues:**

Need for positive outdoor (and water-based) experiences in childhood

<p><b>Goal Statement 3:</b> All Minnesotans* will be positive stewards by make positive daily decisions** based on their true costs*** and implications for long-term water quality and quantity.</p> <p>* general public, students, businesses and industries, extractive industries, elected/appointed officials, and decision-makers ** personal or organizational decisions *** ecological, social, human health, and economic</p>	
<p><b>Strengths</b> (what we know)</p>	<ul style="list-style-type: none"> <li>• Working for the common good is a social norm in Minnesota.</li> <li>• The affluence of many Minnesotans allows them to have time and resources to give attention to environmental protection.</li> <li>• The knowledge of what positive daily decisions are is increasing. Example actions people are aware of include erosion control, road salt reduction, proper fertilizer and pesticide use, stormwater infiltration, etc.</li> <li>• Regulations are point of leverage to guide decisions and behavior.</li> <li>• Much good information exists to support this goal.</li> <li>• Increasing citizen stewardship can have a huge impact on Minnesota's water resources.</li> </ul>

<p><b>Weaknesses</b> (what we don't know)</p>	<ul style="list-style-type: none"> <li>• Regardless of what is already known, many do not know the "positive daily actions" they can and should be taking for water quality protection.</li> <li>• The "true costs" of not taking positive action is not fully understood.</li> <li>• Behavioral change can be difficult, with many barriers impeding individuals and organizations from taking the action they have decided to take. More knowledge and skill is needed in assisting individuals and organizations in successfully accomplishing behavioral change.</li> <li>• "Crowded," busy, and underfinanced lives diminish the propensity of some to take action to protect the environment – it is just too far down on their priority list.</li> <li>• We are not very good at full cost accounting – i.e., accounting for costs externalized to others over time or space, or over beings other than humans.</li> <li>• Nonlinear relationships between decision, action and response.</li> <li>• Goal is very complex; it is difficult to fully or accurately assess true costs.</li> <li>• Will there be a marketing and education budget to achieve this goal?</li> <li>• Will there be support to fulfill this goal, education plan, and whole water sustainability framework plan?</li> </ul>
<p><b>Opportunities</b> (gaps analysis)</p>	<ul style="list-style-type: none"> <li>• The concept of "social marketing" is becoming more known and accepted – that it takes motivation in addition to knowledge to evoke change.</li> <li>• Certain populations, such as the younger "care generation" (?) and retired baby boomers may be positioned and interested in working for positive change.</li> <li>• New immigrant groups may bring with them a mindset and skill set that can support positive change – that needs to be explored (such as Jenny Winkelman is doing).</li> <li>• Key Minnesotan personalities, e.g., Joe Mauer, Don Shelby, ???, could be role models for taking action for environmental protection (this can backfire too, as those in the public eye can have private failings that compromise efforts).</li> <li>• An opportunity exists to better communicate hidden and long-term costs of decisions.</li> <li>• Strategically targeting municipal officials and decision makers for educational outreach would be a high-yield effort.</li> <li>• Cultivating habits of good decision making requires practice.</li> <li>• K-12 students are in the best position to be reachable and to assess and cultivate habits of good decision making; adults need opportunities for practice (and support) of good decisions, too.</li> <li>• Can track somewhat with new versions of Minnesota Report Card of Environmental Literacy (especially the water-focused questions).</li> <li>• General citizen support for clean, abundant water resources is demonstrated by voting in the clean water amendment.</li> </ul>



<p><b>Threats</b> (issues)</p>	<ul style="list-style-type: none"> <li>• Potential of environmental protection of becoming "uncool" among young people, as seat belt use has.</li> <li>• Potential of a slowing economy to deflect people's focus from the "common good" to the "personal good."</li> <li>• Potential of "care fatigue" setting in.</li> <li>• Lack of demonstrated progress to clean water goals may undermine willingness for people to make change.</li> <li>• Lack of consistent measurement of all costs.</li> <li>• Perceived economic pressures vs. full-cost accounting</li> <li>• Comprehensive assessment of ecological, economic, and health costs.</li> <li>• Need to reach selected target audiences across the state.</li> <li>• Behavior change campaigns (especially by government) are often viewed negatively.</li> <li>• Behavior change is extremely difficult, expensive, and hard to evaluate.</li> <li>• Education staff doesn't always have the skills and experience to plan behavior-change campaigns.</li> <li>• Possible citizen expectation that with the new clean water legacy money, our water resource issues should be taken care of by government. Also possible lack of connection between individual actions, impact on water resources, and power of many small changes.</li> </ul>
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**Summary of Issues:** Full-cost accounting, strategic target audiences (such as municipal officials); need to practice good decisions over time with others; communitywide practice

<p><b>Goal Statement 4:</b> Classroom and community educators will be provided sufficient funding, training, and support to engage Minnesotans of all ages in learning information, skills, and behaviors to protect water resources where they live, work, and play.</p>	
<p><b>Strengths</b> (what we know)</p>	<ul style="list-style-type: none"> <li>• Existing environmental education organizations and resources, including SEEK, MPCA environmental educators, Center for Global Environmental Education, Hamline, Eco Education, University of Minnesota Water Resources Center, Metro WaterShed Partners, cleanwatermn.org, etc.</li> <li>• Many watershed organizations and nonprofit organizations with dedicated water quality education staff.</li> <li>• Professional organizations who regularly dedicate time and resources to sharing water quality protection information, e.g., Minnesota Crop Protection Retailers, Minnesota Corn Growers, Minnesota Association of Cities, etc.</li> <li>• State parks and DNR wildlife and fisheries staff and the water education they provide. MinnAqua is an example.</li> <li>• Science Museum of Minnesota and its permanent and traveling educational displays and presentations.</li> <li>• National Park Service and National Wildlife Service and the water</li> </ul>

	<p>education opportunities they provide.</p> <ul style="list-style-type: none"> <li>• In short, many excellent water education organizations active in Minnesota with creative and dedicated staff.</li> <li>• Multiple players and a consistent message, delivered in many ways through various media, are needed.</li> <li>• Environmental report card indicates that Minnesota residents think they know more than they really know – so we know we need to do a better job of getting the real message across.</li> <li>• Goal statement is clear and concise.</li> <li>• An extensive, diverse network of community educational providers exists (watershed groups, environmental education/nature centers, etc.).</li> <li>• Excellent curricula exist for teachers.</li> <li>• Relevant scope and sequence exists, as does legislative mandate for environmental education.</li> <li>• Addresses the delivery method and need for underlying support to make this plan successful.</li> </ul>
<p><b>Weaknesses</b> (what we don't know)</p>	<ul style="list-style-type: none"> <li>• Many in water quality protection positions were trained in technical aspects of water resources but not in communication, education, and behavior change skills. Additional training needed.</li> <li>• Some organizations are limited to communicating information only and are not able to share values or to advocate for given behaviors.</li> <li>• Some educators are not comfortable being in a role where they advocate and motivate for specific behaviors.</li> <li>• Educators are often limited in their ability to reach underserved groups, e.g., new immigrant groups and non-English speakers.</li> <li>• Classroom teachers are often required to focus on the basics and do not have time during the teaching day to address environmental sciences.</li> <li>• Budget constraints limit the ability for classrooms to take field trips or do field investigations.</li> <li>• Key audience groups are often overlooked, such as professional decision makers as city planners, architects, and engineers. Educators need to be able to talk the language of these audiences and provide the supporting data and documentation they require.</li> <li>• Funding, training, and internal support for teachers is very low.</li> <li>• Most teachers do not possess the background knowledge for conducting core water education concepts.</li> <li>• Preservice requirements in water/environmental education are absent.</li> <li>• Funding for community outreach and education is low.</li> <li>• Addresses the delivery method and need for underlying support to make this plan successful.</li> </ul>

<p><b>Opportunities</b> (gaps analysis)</p>	<ul style="list-style-type: none"> <li>• Watershed groups are well poised for providing community education (but lack sufficient funding).</li> <li>• Teacher training in water education is not required for licensure.</li> <li>• In-service training for teachers could be expanded for all K-12 science and social studies teachers within a given time frame.</li> <li>• Many water educators, resources, and programs exist statewide and are available at low cost.</li> </ul>
<p><b>Threats</b> (issues)</p>	<ul style="list-style-type: none"> <li>• Inbreeding of ideas and approaches; need to take new approaches to work.</li> <li>• Focus on basics in K-12 reduces opportunity to explore water resource topics.</li> <li>• Water education likely to be displaced from priority for funding.</li> <li>• When funds are constrained, or perceived to be constrained. There is not a clear, immediate threat to water resources and water quality by reducing or delaying funding.</li> <li>• The relative absence of teacher knowledge about water is a key threat to water sustainability in Minnesota.</li> <li>• There is a lack of comprehensive and long-term (K-12) exposure to water education concepts in school sufficient to develop K, S &amp; AØ universally in K-12 children.</li> <li>• Effective adult water education will continue to be ineffective and piecemeal without sufficient funding, leading to unsustainable water practices.</li> <li>• Will educators care enough about this to become involved and teach about water sustainability? Will they have the support to do so?</li> </ul>

**Summary of Issues:** Preservice and in-service teacher training; funding for community education/outreach; implementation of systematic K-12 education (in science & social studies)

## **Appendix C. A Compendium of Water Education Resources**

*A Citizen's Guide to Influencing Local Land-Use Decisions* - Minnesota Waters  
<http://www.1000fom.org/sites/default/files/CitizensGuide.pdf>

*A Citizen's Guide to Using Monitoring Data* - Minnesota Waters  
<http://www.minnesotawaters.org/what-we-do/support/water-quality-monitoring>

*Aquatic Wild (Project Wild)*  
<http://www.projectwild.org/ProjectWILDK-12AquaticcurriculumandActivityGuide.htm>

*Best Education Practices for Field Days* - U of MN Extension  
<http://www.extension.umn.edu/FieldDays/>

*Capitol Region Watershed District: A Study of Resident Attitudes and Behaviors Related to Water Quality*  
[http://www.capitolregionwd.org/documents/newsletter\\_winter10.pdf](http://www.capitolregionwd.org/documents/newsletter_winter10.pdf)

*Educating Young People* - UW  
<http://www.uwex.edu/erc/ey paw/>

*Environmental Literacy Report Card*  
[http://www.seek.state.mn.us/eemn\\_b.cfm](http://www.seek.state.mn.us/eemn_b.cfm)

*Environmental Literacy Scope and Sequence*  
[http://www.seek.state.mn.us/eemn\\_c.cfm](http://www.seek.state.mn.us/eemn_c.cfm)

*GreenPrint for MN: State Plan for Environmental Education (3rd Ed.)*  
[http://www.seek.state.mn.us/eemn\\_d.cfm](http://www.seek.state.mn.us/eemn_d.cfm)

*Groundwater Education*  
Contact Chris Elvrum at the Metropolitan Council

*Hands On, Feet Wet: The Story of River Crossing Environmental Charter School*  
[http://www.portage.k12.wi.us/faculty/rydbergv/handson\\_feetwet.cfm](http://www.portage.k12.wi.us/faculty/rydbergv/handson_feetwet.cfm)

*Healthy Rivers*  
<http://www.dnr.state.mn.us/healthyivers/index.html>

*Lake Ecology* - Minnesota Waters  
<http://www.minnesotawaters.org/what-we-do>

*Minnesota Academic Standards (Science K–12, 2009; Geography, History, Social Studies, etc.)*  
[http://education.state.mn.us/MDE/Academic\\_Excellence/Academic\\_Standards/Science/index.html](http://education.state.mn.us/MDE/Academic_Excellence/Academic_Standards/Science/index.html)

*Minnesota Environmental Initiative-Land and Water Policy Project (7/7/09) - Integrated Community Assistance Recommendations*  
<http://www.mn-ei.org/projects/Land.html>

*Minnesota's Nonpoint Source Pollution Prevention Plan (used for 319 planning)*  
<http://www.pca.state.mn.us/water/nonpoint/mplan.html>

*Minnesota Statutes, 115A.073* ó defines state environmental education objectives  
<http://www.revisor.mn.gov/statutes/?id=115A.073>

*Mississippi and St. Croix Rivers Online Curriculum - National Park Service*  
<http://www.nps.gov/learn/curriculum.cfm>

*Mississippi Watershed Management Organization - Hmong Study*  
Jenny Winkleman, <http://www.mwmo.org/staff.html>

*MNAQUA*  
<http://www.dnr.state.mn.us/minnaqua/index.html>

*My Story as Told by Water - David Duncan*  
<http://search.barnesandnoble.com/My-Story-as-Told-by-Water/David-James-Duncan/e/9781578050833/?itm=1&USRI=my+story+as+told+by+water%2c+david+duncan>

*Project 2016 - American Association for the Advancement of Sciences; reforms on science, math, and technical education*  
<http://www.project2061.org/>

*Project WET (Water Education for Teachers)*  
<http://www.projectwet.org/>

*Project WET Companion - Water Ways: A Minnesota Primer [DRAFT]*  
<http://www.projectwet.org/>

*Project WET Conceptual Framework (7 key principles)*  
<http://projectwet.org/water-education-project-wet/project-wet-publications/education-conceptual-framework/>

*Project WET offshoot curriculum guides (e.g., Healthy Waters, Healthy People)*  
[http://www.seek.state.mn.us/region\\_detail.cfm?region=All%20Minnesota](http://www.seek.state.mn.us/region_detail.cfm?region=All%20Minnesota)

*River Education Network and River Institutes (CGEE)*  
*Rivers Project from Acorn Naturalists*  
<http://www.acornnaturalists.com/store/RIVERS-PROJECT-CURRICULUM-GUIDE-LANGUAGE-ARTS-P327C0.aspx>

*River Watch* (extracurricular student monitoring, being applied in the Red River Basin) -  
International Water Institute

<http://www.internationalwaterinstitute.org/riverwatchmain.htm>

*School-specific curricula* (e.g., River's Edge Academy, Riverway Learning Community, District  
196 School of Environmental Studies)

Contact specific schools for this information

*Stormwater Steering Committee Education Work Group Recommendations*

<http://www.pca.state.mn.us/water/stormwater/steeringcommittee/index.html#workgroups>

*To the Source: Moving Minnesota's Water* - Citizens League

<http://www.citizensleague.org/what/policy/advancement/water-1/>

*Volunteer Surface Water Monitoring Guide* - MPCA 2003

<http://www.pca.state.mn.us/index.php/water/water-monitoring-and-reporting/volunteer-water-monitoring/volunteer-surface-water-monitoring-guide.html>

*Water on the Web*

<http://waterontheweb.org/>

*Water Science for Schools* - USGS

<http://ga.water.usgs.gov/edu/>

*Waters to the Sea* - CGEE

<http://www.hamline.edu/cgee/waters2thesea/>

*Watershed Dynamics* - NSTA - Carlsen, Trautmann, Environmental Inquiry Team

<http://search.barnesandnoble.com/Watershed-Dynamics/William-S-S-Carlsen/e/9780873552134/?itm=1&usri=Watershed+Dynamics>

*Water Works Institute* - American Water Works Association and MN Dept. of Health

<http://www.mnawwa.org/education/youtheducationprogram.html>