

CHAPTER 5 WATER CONSERVATION IN THE GREAT LAKES-ST. LAWRENCE REGION

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5.1. INTRODUCTION

Research on water conservation conducted under this project was pursued because of an identified need for additional information to support the Great Lakes Charter Annex's mandate for a decisionmaking standard that includes water conservation measures. Although this topic was not part of the original project work plan, the Project Management Team agreed that water conservation can inform the decision support process and authorized the additional research. The information in this chapter outlines these research efforts, which were based on the survey of state and provincial water use and conservation programs and supplemented with information on conservation best management practices. Due to the focus of the survey effort, which was limited to water conservation at the state and provincial scale, additional research on local water conservation efforts undertaken by entities such as municipalities and agricultural districts would be extremely useful to more fully support the Charter Annex requirements. Additional information about the elements of existing programs and guidelines is found in the Appendix.

5.1.1 A CASE FOR WATER CONSERVATION

The eight states and two provinces, which comprise the binational Great Lakes region, are blessed with an abundance of high quality fresh surface water. Collectively, the Great Lakes and their connecting channels comprise the world's largest body of fresh surface water and arguably represent the greatest freshwater resource in the world. The Great Lakes contain 6.5 quadrillion gallons (24.6 quadrillion litres) of fresh surface water, 20 percent of the world's supply and 95 percent of the supply in the United States. This seemingly inexhaustible supply of fresh surface water has meant that in the past the Great Lakes region has not needed to be overly concerned with water supply management issues such as water conservation.

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Reliable water supplies continue to be readily available to the majority of the Great Lakes basin's population, and the large quantity of basin water will likely continue to provide for growing water needs. However, in some localized cases, water conservation and responsible water use is needed to provide a viable solution to current shortages or to provide protection to ecologically and hydrologically sensitive areas. For example, Monroe County, Michigan, located in the southeast corner of the state, relies on groundwater for drinking water and irrigation, but aquifers have been depleted due to quarry operations. Oakland and Macomb Counties, also in southeastern Michigan, likewise have recently experienced aquifer depletion due to low rainfall, higher than normal temperatures and rapid residential development. Addressing infrastructure needs is one way to address these concerns by providing for long-term dependable surface water supplies, but the potential cost savings from water conservation measures would likely outweigh the costs of many of these infrastructure projects.

Ecological benefits also result from water conservation because less water is removed from an original source (lakes, rivers, aquifers, etc.), thus reducing alterations to natural levels and flows and consequent disruptions to associated ecosystems.

Even in areas that currently have abundant sources of water, conservation measures may increase efficiencies and lead to lower operating costs. A public water supplier that implements an effective water conservation program can forego or delay system and plant expansion, thus reducing capital outlays while keeping operating costs at a manageable level. The city of Barrie, Ontario, used water conservation to reduce wastewater flows, easing the need for supply and wastewater infrastructure while providing savings to customers. Saginaw, Michigan has successfully used a similar conservation approach. Savings can also be realized in other sectors, such as industry and agriculture. All communities can reassess the economic potential of water conservation, even if they have historically believed that conservation reduces water-related revenue.

Based on the potential benefits of water conservation, support for a regional water conservation approach has arisen in recent years. In its February 2000 report to the governments of the United States and

Canada, the International Joint Commission observes, "Because of a possible downward trend in net Basin (water) supply in the 21st century, water-conservation and demand-management practices should become increasingly important components of any overall sustainable use strategy." The report suggests, "Implementation of the Basin Water Resources Management Program – to which the states and provinces are committed under the Great Lakes Charter – could provide the opportunity to launch a water-conservation initiative." Through the Great Lakes Charter Annex, the region further committed itself to the pursuit of responsible water management through a new decisionmaking standard that includes water conservation.

5.1.2 WATER CONSERVATION WITHIN A DECISION SUPPORT SYSTEM FRAMEWORK

Any water resources management decision support system must provide information and a process appropriate to reaching decisions on new proposals that withdraw and use water from the Great Lakes-St. Lawrence River basin. In Directive #3 of the Great Lakes Charter Annex, the Great Lakes governors and premiers agreed that a new decisionmaking standard on proposals for new or increased water withdrawals should be based on four principles, and the first principle is "preventing or minimizing Basin water loss through return flow and implementation of environmentally sound and economically feasible water conservation measures." Based on this premise, a commitment to water conservation will be an essential consideration within the new decisionmaking process. Further, information on the intents of prospective users regarding water conservation will provide decisionmakers with valuable input on responsible use. Water conservation measures will lower the consumptive use quantities for a proposed water withdrawal and will reduce individual and cumulative impacts associated with the project. Specific ecological and hydrological sensitivities of watersheds should also be considered in the decisionmaking process.

Implementation of water conservation measures provides value for in-basin interests, but also would allow regional decisionmakers to insist on responsible water use by prospective out-of-basin water users. Consideration of both types of prospective users is important in the region because in recent years, renewed interest and attention has been focused on Great Lakes water resources management and water supply issues generated, at least in part, from proposals by outside (i.e., non-basin) interests to export Great Lakes water to other parts of the North American continent and the world. To protect Great Lakes system resources from excessive and disruptive uses by outside interests while complying with international trade laws, the decisionmaking process must not give special consideration to proposed water withdrawals occurring within the basin. Water conservation provides a measurement of how effectively the water resource will be used and protected, thus determining the merits of a proposed use and providing an even-handed decisionmaking standard.

5.2. STATE/PROVINCIAL WATER CONSERVATION PROGRAMS AND DROUGHT CONTINGENCY PLANS

Several Great Lakes states and provinces have the authority to implement basic water conservation programs at the jurisdictional level. However, the region has seldom faced severe water shortages requiring the development and implementation of innovative and aggressive water conservation programs. While state and provincial conservation programs exist in all Great Lakes jurisdictions, they vary widely in scope and content, and are usually part of state and provincial drought contingency plans due to the perception (and reality) of abundant water supplies in most circumstances. Additional water conservation is occurring at the local level, but these programs are difficult to track and are outside the original scope and purposes of this project. Below is a summary of state and provincial water conservation programs and drought contingency plans. The conservation efforts detailed here focus largely on the public supply sector, apparently because the state and provincial agencies dealing with

water quantity that provided survey responses are most closely involved with conservation efforts at that level. A summary table is included as Table 1 at the end of this section.

5.2.1 ILLINOIS

5.2.1.1 Water Conservation

For Lake Michigan water, Illinois has water conservation requirements in effect the entire year, and outdoor water use rules apply during the growing season (May 15 - September 15). The state's water conservation program requires conservation by the end user and the owners of water distribution systems. Requirements for end users include metering of all new services, low-flow plumbing fixtures, lawn sprinkling restrictions and recycling on automatic car wash facilities. All of the municipal permittees have adopted the required ordinances and building codes pertaining to water conservation, so there is no direct monitoring of these conservation efforts by the state. Distribution system owners, or permittees, report annually the amount of Lake Michigan water used along with the amount lost due to unaccounted-for-flow. If a permittee's unaccounted-for-flow exceeds 8 percent, a plan of action for meeting the 8-percent standard must be submitted. Water conservation is also promoted by a variety of pamphlets and booklets the Department of Natural Resources makes readily available.

5.2.1.2 Drought Contingency Plan

The state has no drought contingency plan, but the Department of Natural Resources encourages permittee emergency water conservation plans in case of temporary water supply failure. A Governor's Drought Task Force makes recommendations on drought situations.

5.2.2 INDIANA

5.2.2.1 Water Conservation Program and Drought Contingency Plan

Indiana has no formal water conservation program. The Indiana Water Shortage Plan provides criteria for determining the severity of a drought and recommends actions that should be taken during three water shortage phases. The plan recommends approaches for individuals, utilities, and local and state governments to conserve water during different stages of drought and establishes priorities for water use. Phase I and Phase II occur through a joint declaration of the Department of Natural Resources and the State Emergency Management Agency. These phases focus on voluntary water use reductions and public outreach. Phase III involves an emergency declaration by the governor and mandatory restrictions on certain water uses. Also, a governor's advisory Water Shortage Task Force can be formed with representatives from several agencies.

5.2.3 MICHIGAN

5.2.3.1 Water Conservation Program and Drought Contingency Plan

Michigan has no formal statewide water conservation or drought management plan. In the past, interdepartmental task forces have been formed to address drought conditions. Individual municipalities or local governments implement drought management measures as necessary.

5.2.4 MINNESOTA

5.2.4.1 Water Conservation Program

Minnesota's water conservation program includes both planning and permitting requirements. The state requires all permittees to use water efficiently and meet certain permit conditions. The state Department of Natural Resources coordinates conservation requirements with the state Department of Health for well construction approvals, Drinking Water Revolving Fund requests and wellhead protection efforts. Approaches to water conservation include planning, education, conservation rate structures, metering, leak detection and repair, retrofitting programs, local regulations, and elimination of wasteful use.

Minnesota Statutes specifically require conservation plans for public water suppliers and agricultural irrigators. Public water suppliers must implement demand reduction measures before requesting approvals for construction of new municipal wells and increases in permitted water withdrawals. Public water suppliers must have unaccounted-for water volumes below 20 percent as a condition of their permit. Irrigation permit applicants must obtain approval from the county soil and water conservation district, which may impose site-specific conservation requirements.

5.2.4.2 Drought Contingency Plan

The state's drought contingency plan is specific to the Mississippi River, but is being updated to reflect all state resources. As part of the drought plan, public water suppliers serving more than 1,000 people must have an approved water emergency and conservation plan, which is updated every 10 years. These plans are required for wellhead protection plans and applications for the state's Drinking Water Revolving Fund. All surface water appropriators must have an approved contingency plan. As the plan goes into effect, statutory water use priorities determine which water uses are suspended. An agency and stakeholder task force helps implement the plan.

5.2.5 NEW YORK

5.2.5.1 Water Conservation Program

The Department of Environmental Conservation's Public Water Supply Permit Program (PWSPP) requires new water supply permit applicants to have water conservation programs. The water supplier holds responsibility for implementing the program, and the PWSPP monitors compliance with the programs. The PWSPP requires permittees to develop and implement long-term water conservation measures such as metering, meter replacement/calibration, system water audits and leak detection and repair. The goal of each program is to keep unaccounted-for water to 15 percent or less. The PWSPP also requires publicity and consumer education efforts.

5.2.5.2 Drought Contingency Plan

The State Drought Management Task Force, a group of several state agencies, evaluates drought conditions and recommends to the governor and State Disaster Preparedness Commission which drought stages should be announced. During "Watch" and "Warning" stages, conservation recommendations focus on outdoor use and there are no mandatory statewide restrictions. The governor can declare an "Emergency" stage and require water conservation measures. In the "Disaster" stage, restrictions can be more strict and the governor may request federal assistance. The state Department of Health (DOH) also requires community water supply systems with more than \$125,000 in annual gross operating revenues to have a Water Supply Emergency Plan. Local water suppliers are responsible for implementation, and the DOH monitors compliance.

5.2.6 OHIO

5.2.6.1 Water Conservation Program and Drought Contingency Plan

Ohio has no formal water conservation program. Ohio's Drought Response Plan has four phases, with increasing amounts of water conservation. Various levels of voluntary water conservation measures are requested during Phase 2 and Phase 3 Drought Alerts. At these levels, public water suppliers, their customers, and private withdrawers are asked voluntarily reduce their water use. A Phase 4 Drought Emergency, which involves mandatory water use restrictions, occurs by the governor's declaration when water supplies will not meet projected demands and the Palmer Drought Severity Index reaches -4.0 or lower. The Ohio Emergency Management Agency heads Ohio's drought response team and enforces water use restrictions. The Drought Executive Committee is activated during Phase Three and includes relevant agencies and interest groups that assist in monitoring water use to identify non-compliance.

5.2.7 ONTARIO

5.2.7.1 Water Conservation Program

Ontario has no formal water conservation program, but federal, provincial and local governments employ a variety of conservation strategies. Many communities restrict outdoor water use, require meter installations and require conservation plans while the federal government supports water conservation through research, information sharing and funding local conservation efforts.

At the provincial level a number of regulations impact water conservation. The Ministry of Environment and Energy (MOEE) Permit to Take Water program requires a permit for withdrawals greater than 50,000 litres (13,200 gallons) per day and gives priority to natural ecosystem function protections. Water conservation is required for permit applications in the Greater Toronto Area. Provincial building codes require low-flow plumbing fixtures, retrofits, education programs and support for municipal conservation efforts. The Provincial Planning Act requires regard for water conservation during planning. The Ministry of Environment and Energy undertakes provincial water conservation education initiatives and the Ministry of Agriculture and Food promotes agricultural best management practices for agriculture.

5.2.7.2 Drought Contingency Plan

Drought is managed through the Ontario Low Water Response Plan, which uses partnerships between local and provincial agencies. A local Water Response Team is formed of stakeholders, who work with provincial ministries to formulate a watershed plan. The plan relies on existing legislation to ensure provincial preparedness and to support and coordinate local response. For example, the Ontario Water Resources Act allows the Minister of Environment and Energy to limit water withdrawals for permitted uses. The plan includes three drought indicator levels. Level I seeks a voluntary 10 percent reduction in water use. Level II seeks a voluntary 20 percent reduction, and municipal bylaws may be enacted to restrict non-essential uses. Level III includes mandatory water use restrictions and allocation priority recommendations.

5.2.8 PENNSYLVANIA

5.2.8.1 Water Conservation Program

In Pennsylvania, public water supply agencies withdrawing or using surface water are required to develop a water conservation program. The Department of Environmental Protection provides its Drought Information Center guidelines to assist in program development, and a Permit Compliance Report process ensures that a variety of conservation efforts occur. The state investigates public water supply systems

that do not have water use that falls between 40 and 70 gallons (150 and 265 litres) per capita per day. The last comprehensive study indicated a statewide average usage of 62 gallons (235 litres) per capita per day for metered systems. The state also investigates unaccounted-for-flows that exceed 20 percent by looking at domestic connection per capita usage.

5.2.8.2 Drought Contingency Plan

Streamflow, groundwater levels, reservoir storage, precipitation, and the Palmer index are all used to determine one of three stages of drought. Levels of reduced water use are targeted within each stage: 5 percent in Drought Warning, 10 to 15 percent in Drought Watch and at least 15 percent in Drought Emergency. The third stage may also include mandatory restrictions. Water suppliers in a drought emergency area can ration water during the emergency stage with approval from the Commonwealth Drought Coordinator. The state's drought regulations require water supply systems with more than 50 connections to provide the Department of Environmental Protection with drought contingency plans. Industrial and commercial water users that use more than 100,000 gallons (380,000 litres) per day in any 30-day period must also have a drought plan.

5.2.9 QUÉBEC

5.2.9.1 Water Conservation Program and Drought Contingency Plan

Québec has no mandatory water conservation program or drought contingency plan, but conservation efforts occur at the local level, and provincial ministries provide financial support to some non-governmental organizations, such as RÉSEAU Environment, which promotes water conservation through publications, conferences, publicity campaigns and a website (www.reseau-environnement.com). Québec also provides financial support to small municipalities for replacement or improvement of drinking and wastewater infrastructure. Municipalities take measures such as limiting hours when lawns can be watered and working with other organizations to provide education and incentive programs. Some municipalities and organizations, such as the Montreal Urban Community have education programs in schools and awards for institutions that improve their water management.

5.2.10 WISCONSIN

5.2.10.1 Water Conservation Program

Wisconsin has no required formal water conservation plan, but the state recommends water conservation plans as part of wellhead protection plans, which are required for all new municipal wells. The Department of Natural Resources regulates supply sources and users, such as community water supplies and hydroelectric facilities. The Public Service Commission regulates water rates, pressure standards and system losses, and the Department of Commerce regulates water use standards for new plumbing fixtures.

5.2.10.2 Drought Contingency Plan

The statewide drought contingency plan takes effect when the governor declares an Emergency Executive Order. This plan can include mandatory water conservation measures that occur as a drought increases in severity, but there are no compliance provisions. A statewide technical advisory committee has given consideration to the criteria for determining the stages of a drought, but no statute or rule has been adopted.

5.2.11 SUMMARY AND ANALYSIS

A variety of water conservation efforts are occurring at the state/provincial level, but room exists for further progress. Current water conservation practices that some jurisdictions require or encourage for water supplier plans include:

- Use of low-flow plumbing fixtures
- Metering
- Outdoor water use restrictions
- Reports on water use and unaccounted-for flow
- Publicity and consumer education
- Rate structures
- Wellhead protection plans, and
- Leak detection and repair.

*downspout disconnection
flow saving*

These practices provided initial guidance in developing the 15 recommended conservation measures in the following section of this chapter. Many of the above conservation practices are implemented at the municipal/local level, where they are most effective, and further research is needed to assess the extent of these water conservation efforts, which include initiatives such as education and outreach. Research is also needed to determine the level of water conservation that is occurring in other water use sectors, such as the industry and agriculture.

Several of the water conservation programs in place effectively promote water conservation and provide elements that should be considered in development of a regional initiative. Illinois' water conservation program is noteworthy for the fact that it provides specific conservation requirements and implements a year-round program. Knowledge gained and lessons learned from Illinois' water conservation program requirements, Minnesota's and Ontario's permit-related water efficiency requirements, New York's and Pennsylvania's water supplier conservation program requirements, and elements of the drought contingency plans should be considered when assembling guidance for basin-wide water conservation. Because these programs focus mainly on the public supply sector, other elements will need to be integrated into a regional water conservation approach based on the outcomes of future research on other water use sectors. Those jurisdictions without any water conservation program have a clear need to devote time and resources to plan and implement a program.

The existing drought contingency plans all seem to provide an appropriate process for dealing with an emerging water shortage situation and are somewhat adaptable to the needs of each year. Those jurisdictions that have no drought contingency plan should develop plans in the near future so they can deal with future water shortage situations, which could be exacerbated by climate change. Most municipalities do not have drought contingency plans in place because the continual need is not understood and they also need to work to develop appropriate plans. As a basic step toward better regional water conservation, effective drought contingency plans need to be adopted at the state and provincial levels. Municipalities, agricultural districts, and other entities that need to deal with drought conditions should also develop drought contingency plans.

Table 1. Summary of Jurisdictions' Water Conservation Programs, January 1, 1998

Jurisdiction	Conservation Program at State/Provincial Level	Local Conservation Efforts	State/Provincial Drought Contingency Plan
Illinois	For Lake Michigan water, conservation required and outdoor rules apply during growing season. System owners and end users both required to conserve. Promotion through printed materials. Permittees cannot exceed unaccounted-for-flow of 8 percent.	Municipal permittees have adopted ordinances and building codes requiring conservation.	None, but individual plans encouraged for permitted users. Governor's Drought Task Force discusses drought conditions.
Indiana	None, except during drought.	Local governments support conservation efforts during drought.	Three water shortage phases used with recommendations for action. First phases use voluntary reductions and public outreach. Phase III uses mandatory restrictions. Water Shortage Task Force can be formed to advise the governor.
Michigan	None	Individual municipalities and local governments use drought measures as necessary.	None, but ad hoc interdepartmental task forces have been formed.
Minnesota	Permits require all users to be efficient. Public water suppliers and agricultural irrigators must have conservation plans.	Local demand management measures are required to obtain approvals for new municipal wells or increases in authorized water volumes.	Current plan specific to Mississippi River, but being updated to whole state. Public suppliers and surface water users must have contingency plans. Drought plan includes mandatory restrictions. Multi-agency/stakeholder task force implements the plan.
New York	Water suppliers required to have conservation programs. Goal to maintain unaccounted-for water below 15 percent. Publicity and consumer education efforts required.	Local entities may provide additional support.	State Drought Management Task Force recommends four different drought stages. The first two stages focus on voluntary reductions. The final two stages use mandatory restrictions.
Ohio	None, except during drought.	Local entities may provide additional support.	Four phases of drought are used. The second two phases use voluntary conservation and public education; phase four uses mandatory restrictions after governor declaration. Drought Executive Committee is activated in phase three.
Ontario	Building code and planning laws require low-flow plumbing and other conservation measures. Education initiatives promote conservation. Provincial Water Use Strategy guides efforts.	Municipal levels have regulations and are involved in education during low water conditions. Communities receive federal money to reduce public use.	Three drought indicator levels used. First two levels are voluntary, and third is mandatory. Ontario Low Water Response Plan guides partnerships between local and provincial agencies. Local Water Response Teams develop conservation plans.
Pennsylvania	Public water suppliers using surface water required to have conservation program. Various conservation efforts are used.	Local entities may provide additional support.	Three drought stages used. The first two stages have voluntary restrictions of various levels. The third stage may also include mandatory restrictions. Water suppliers and commercial and industrial users required to have drought plans.
Québec	None, but provincial ministries provide financial support to local efforts and NGOs. The organization RÉSEAU-Environnement promotes conservation through a variety of methods.	A range of conservation occurs at local scale, including infrastructure replacement, restrictions on water use, and education programs.	None
Wisconsin	None, but conservation plans recommended as part of wellhead protection plans (required for municipal wells). System losses regulated by Public Service Commission. Plumbing flows regulated by Department of Commerce.	Local entities may provide additional support.	Declaration determines the presence of drought emergency. Formal plan, stages not used. Mandatory restrictions imposed with declaration of drought emergency.

5.3. DEVELOPING COORDINATED CONSERVATION PROGRAMS

The Great Lakes basin needs a coordinated model of water conservation programs that can be implemented by the states and provinces. By developing and implementing a coordinated approach across the basin, the states and provinces ensure that appropriate water conservation efforts are occurring, which allows outside observers to recognize that water resources are being managed responsibly.

The rationale for a coordinated approach is found in the International Joint Commission's February 2000 report, *Protection of the Waters of the Great Lakes*, and the June 2001 Great Lakes Charter Annex. The IJC report recommends a coordinated approach to water conservation in the Great Lakes basin: "Sharing of conservation experiences among basin jurisdictions should be an integral part of the overall approach to conservation programs and practices. Jurisdictions may wish to adopt some common approaches, as appropriate, in their water conservation plans, including incentives to encourage water demand-management initiatives and the installation of best practicable water-saving technology." In Directive #6 of the Great Lakes Charter Annex, the governors and premiers agreed to "develop guidelines regarding the implementation of mutually agreed upon measures to promote the efficient use and conservation of the Waters of the Great Lakes Basin within their jurisdictions." Based on this provision and Directive #3, which stipulates that water conservation will be part of the decisionmaking standard, water withdrawal proposals will need to demonstrate comparable water conservation efforts.

In developing the elements of a water conservation standard, the goals for the regional effort and the needs of individual water systems need to be considered. At the regional level, the Annex mandates the implementation of "environmentally sound and economically feasible" water conservation measures. A water conservation standard that can be applied to both in-basin and out-of-basin water users will need to be developed that will allow coordinated conservation efforts to move forward. Individual states, provinces, municipalities and other water users also need to adopt those practices that are best suited to unique situations, including climate, existing infrastructure and social behaviors. In particular, those areas with high levels of consumptive use and those areas with unique hydrological and ecological sensitivities need to be the focus of water conservation efforts.

In developing a coordinated approach to water conservation, the region needs to include both old and new withdrawal projects. This inclusive approach will most closely match the type of coordinated regional water conservation program recommended in the 2000 IJC report and committed to within the 1985 Great Lakes Charter's plans to develop a basin water resources management program.

5.4. BASIC GUIDANCE FOR REGIONAL WATER CONSERVATION

The states and provinces need guidance that will help them develop water conservation approaches that have regional consistency. Some basic guidance that focuses on public water suppliers is provided in this section, and additional research is needed to provide more comprehensive guidance.

As outlined in the section on state and provincial water use programs, several basin jurisdictions currently require or encourage water suppliers to pursue specific water conservation practices. These should be a foundation in the development of any model programs or guidance to be considered at the regional level. Based on these practices and several consulted guidelines, Table 2 has been compiled to provide a list of 15 water conservation measures that could be implemented by state, provincial and regional decisionmakers as well as municipalities, water suppliers and other water users involved in water use planning activities. Measures are categorized as Financial, Programmatic, Technological and Informational.

5.4.1 FINANCIAL

In the residential water use sector, programs offering financial incentives can be used to encourage water conservation. Some of the most common are paying for or subsidizing retrofits and replacement of older plumbing fixtures. Replacement of older fixtures allows for instant reductions in water use. Also, rate structures can be incorporated into bills so that end users have incentives to conserve water. For public water suppliers, metering and submetering allow for the establishment of rate structures with incentives for reduced water use and give end users the ability to track water use. By using rate structures and metering, a user who pays attention to water use can make a conscious effort to reduce water use and receive financial benefits through reduced costs. Similarly, industrial facilities can install their own meters to monitor water use at various points in a production process so that potential conservation savings can be identified.

Table 2. Fifteen Suggested Water Conservation Measures

	Water Conservation Measure
Financial	<ul style="list-style-type: none"> • Incentives to improve water conservation, including retrofits • Conservation pricing/rate structures • Metering and submetering for industrial uses • Universal metering/submetering with commodity rates for public supply water
Programmatic	<ul style="list-style-type: none"> • Reports on water use and unaccounted-for flow • Leak detection and repair; reductions for water utility operations • Integrated resource planning • Water system pressure management to reduce volume of water used • Water recirculation and reuse in industrial processes
Technological	<ul style="list-style-type: none"> • Low-flow plumbing fixtures and other water-efficient appliances • Efficient equipment for industrial/commercial facilities and agriculture
Informational	<ul style="list-style-type: none"> • Promoting efficient practices in industrial/commercial facilities and agriculture • Encouraging efficient water use and equipment for landscapes, including graywater • Public information and school education programs • Advocating use of native and drought-tolerant turf and plants

5.4.2 PROGRAMMATIC

Many conservation measures implemented by a water supplier or large end user require an extensively planned and executed program. Reliable information and regularly scheduled reports on water use and unaccounted-for flow help provide for the identification of areas for system improvement or potential problem areas. This can prompt follow-up actions, such as system maintenance or repairs, which can provide more efficient water use for both water utilities and industrial facilities. Public water suppliers may initiate other internal conservation programs that reduce water used for operations, like mains flushing and filtration plant backflushing. Integrated resource planning employs a comprehensive process of considering supply alternatives so the most efficient water supply approaches can be implemented. Other programmatic approaches include altering water system pressure to control water volumes and recirculating and reusing water in industrial processes.

5.4.3 TECHNOLOGICAL

Technological advances create new options for increased efficiency. In the public water supply sector this can be accomplished through the increased use of low-flow plumbing fixtures and appliances. Industrial, commercial, and agricultural equipment can also be made more efficient through technological improvements. The choice of technology largely depends on the individual needs of the water user, but can be as simple as replacing an older toilet with a low-flow model. For example, the U.S. Energy Policy Act of 1992 requires a maximum manufacturing standard of 1.6 gallons (6 litres) per flush for toilets.

5.4.4 INFORMATIONAL

Informational campaigns urge individuals, groups and society to adjust water consumption practices to minimize water quantities needed to accomplish a given task. Public information and school education programs provide information to a wide audience about the need for water conservation and suggest approaches to reduce individual water use. Targeting each water use sector is also an important part of promoting more efficient water use. For example, domestic users can turn off faucets when they are not in use and agricultural users can monitor climate and temperature to irrigate with reduced losses to evapotranspiration. Appropriate adoption and use of landscape equipment also can reduce water use, as can planting of native and drought-tolerant vegetation. Industrial and commercial facilities can often find ways to alter operations or procedures to reduce unnecessary water consumption.

5.5. FINDINGS AND RECOMMENDATIONS

5.5.1 FINDINGS

A region-wide commitment to “environmentally sound and economically feasible water conservation measures” will be a key part of the new water withdrawal decisionmaking process developed under the Great Lakes Charter Annex. This will be especially true for any proposed new or increased uses of Great Lakes water that fall under the Charter Annex process. Increased emphasis on conservation is likely to occur within state and provincial water supply management programs as they are reviewed and changed to meet the requirements of the Great Lakes Charter and Charter Annex.

While reliable water supplies are readily available to a large proportion of the Great Lakes basin’s population, water conservation and responsible water use may provide a viable solution to current shortages in some communities experiencing water supply problems. In particular those areas identified as having particular ecological and hydrological sensitivities will benefit from targeted water conservation efforts. Even in those areas with abundant water, conservation measures may lead to lower costs and provide ecological benefits.

State and provincial level water conservation programs exist in all Great Lakes jurisdictions, but they vary widely in scope and content, and are usually part of state and provincial drought contingency plans. This general lack of comprehensive water conservation programs is largely attributable to the reliability and the abundance of high quality fresh water supplies. The existing drought contingency plans all seem to provide an appropriate process for dealing with an emerging water shortage situation and are somewhat adaptable to the needs of each year, but not all jurisdictions have drought contingency plans. Several of the state and provincial water conservation programs effectively promote water conservation and have elements that could be considered in development of regional guidance for a more comprehensive and coordinated approach to water conservation. Based on current programs and several consulted guidelines, a list of 15 water conservation measures is provided in Table 2 of this chapter as basic guidance.

Programs and models to promote coordination of regional water conservation efforts are lacking. Based on the principles of the Annex, water withdrawal proposals will need to demonstrate a comparable level of water conservation. In developing the elements of a water conservation standard, the goals for the regional effort and the needs of individual water systems need to be considered.

5.5.2 RECOMMENDATIONS

1. Develop and implement a coordinated regional approach to water conservation that addresses the Charter Annex standard of “environmentally sound and economically feasible.”

A coordinated regional approach to water conservation needs to be developed and implemented that will demonstrate the region’s commitment to responsible water management. The region, including each state and province, must remain committed to a new “environmentally sound and economically feasible” water

conservation standard. This will avert potential water shortages and biased decisionmaking while providing economic and technical efficiencies and ecological benefits. As a first step, regional goals should be developed for “environmentally sound and economically feasible” water conservation by water use sector based on a more refined definition. The region should apply guidance to both old and new withdrawal projects.

2. Develop model guidance for state/provincial water conservation programs.

Development of model guidance at the regional level based on jurisdiction conservation experiences would help the states and provinces in their efforts to develop water conservation programs. The guidance should enable state/provincial level legislators or other decisionmakers to take the steps necessary to build a jurisdiction water conservation program. Elements of the current state and provincial water conservation programs, including the list of 15 best management practices in this chapter, should be used in conjunction with other research to provide this guidance. Illinois’ water conservation program requirements, Minnesota’s and Ontario’s permit-related water efficiency requirements, New York’s and Pennsylvania’s water supplier conservation program requirements, and elements of drought contingency plans should be considered when assembling basin-wide water conservation guidance.

3. Conduct research and establish an information clearinghouse on best management practices for water conservation by individual water use sectors.

The information within this chapter, including the list of 15 best management practices, needs to be followed up by more in-depth water conservation research, including surveys of existing water suppliers (largely at the local level) that provide profiles of existing programs; case studies of effective programs in the arid Western United States, where water conservation programs are more robust by necessity, or elsewhere in the world; and identification of appropriate measures that should be included in a decisionmaking standard. This research should provide information on water conservation technologies and approaches that would be most beneficial in the Great Lakes region. This research should outline which water conservation practices are most applicable to each water use sector and special local conditions, such as ecological sensitivities. A clearinghouse that details this research should be developed and maintained to provide water users and decisionmakers with the information.

4. Develop and update state/provincial drought contingency plans.

As a basic step toward better regional water conservation, effective drought contingency plans need to be adopted at the state and provincial levels. Those jurisdictions that have no drought contingency plan should develop plans so they can deal with future water shortage situations, which could be exacerbated by climate change. Municipalities, agricultural districts, and other entities that need to deal with drought conditions should also develop drought contingency plans.

5. Develop specific water conservation provisions as part of state/provincial water management programs.

All states and provinces can further develop water conservation provisions within their water management programs. Those jurisdictions without any water conservation program have a clear need to devote time and resources to plan and implement a program.

6. Undertake an economic analysis showing the financial benefits of water conservation.

An economic analysis needs to be undertaken that demonstrates the economic benefits of various water conservation measures. This analysis would help in defining which conservation approaches are “economically feasible” for the region.

7. Develop a regional information/education program on the need for water conservation.

The region needs to develop and implement an information/education program that promotes the need for water conservation and explains its benefits. A key part of any successful water conservation program is educating water users on how to use water efficiently so they can adjust consumption habits to minimize water quantities needed to accomplish a given task. A successful program would be an ongoing effort that utilizes a variety of publicity tools.

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