

The frog does not drink up the pond in which he lives.

—Native American proverb

# **The Fate of the Great Lakes**

## **Sustaining or Draining the Sweetwater Seas?**

by Claire Farid, John Jackson and Karen Clark

Published by the  
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on the twelfth anniversary of the  
signing of the Great Lakes Charter  
February 10, 1997



# Acknowledgements

## THE PROJECT TEAM

The **Sustainable Water Resources Task Force** of **Great Lakes United** had the original vision for this report. Its purpose is to focus efforts throughout the Great Lakes Basin on preventive measures to achieve long-overdue water conservation actions. This report will serve as the platform for the task force's public campaign to achieve this goal.

**Sarah Miller**, co-chair of the task force and coordinator of the Canadian Environmental Law Association, coordinated the project.

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**To the future generations  
that will inhabit the Great Lakes Basin**



# Belying Our Bounty

The frog does not drink up the pond in which he lives.  
—Native American proverb

For many years, Great Lakes United and the Canadian Environmental Law Association, the publishers of this report, have advocated wise use of the “sweetwater seas.” The agenda for this work has been developed together with the community of the Great Lakes–St. Lawrence River ecosystem through several task forces of Great Lakes United. Each year since 1982, citizens have brought their concerns to Great Lakes United’s meetings where issue task forces put these concerns into resolutions to form the basis for action plans.

In 1994, the Sustainable Water Resources Task Force of Great Lakes United voted to research and publish a report gathering together chronic and emerging issues that will determine the sustainability of the waters of the Great Lakes for future generations. Two years later this report is being released on the twelfth anniversary of the signing of the Great Lakes Charter, February 10, 1985.

It is our hope that this report will achieve what the charter has failed to accomplish by instilling a long-overdue conservation ethic into all realms of the Great Lakes. It will become the basis of our citizens’ campaign for a sustainable water strategy for the Great Lakes, which includes the goal of reducing human use of water by 50 percent by the year 2005.

It is time for the public to again take leadership to protect the Great Lakes and to create anew the political will to protect the treasure we live with—one-fifth of the world’s supply of fresh water. Just as the waters of the Great Lakes rise and fall, so has the attention of politicians to water quantity and its role in the health and wellbeing of communities so dependent on these waters.

The Great Lakes community must move from event-driven and short-term crisis management to long-term preventive ecosystem actions. Our community has successfully played a proactive role in response to contamination of our water. We must do the same for the integrity and sustainability of the Great Lakes water resource as a whole.

In this report we give background on the challenges that face us. The first section of the report, “The Ins and Outs of the Great Lakes,” documents the natural and human-made influences on the system and describes the diversions that have shaped the use of the Lakes. The important interventions of Great Lakes United and other public interest groups in the Basin in diversion proposals have successfully opposed some proposals for diversions and set important precedents to protect the waters of the Great Lakes. Public involvement in the International Joint Commission’s Reference on Lake Levels has also resulted in a strong voice for preventive and adaptive measures to avoid further engineered controls of the system. This history provides important lessons that we can build on in our future campaigns.

In 1985, the states and provinces in the Great Lakes and St. Lawrence Basin signed the Great Lakes Charter. This charter had the potential to be a framework for sustainability by gathering data on use of the waters of the Great Lakes, by gauging future demands, by promoting cooperation, and by preventing diversions. The second part of our report, “Who’s in Charge? Piecing Together the Patchwork of Protections,” delineates the many government responsibilities for water quantity, and analyses provisions of the Great Lakes Charter, its implementation, and its failure to achieve its original intent. We trace the lack of ecosystem action and cooperation in sharing our

Great Lakes bounty. This section also explores the role of the International Joint Commission in regulating levels and flows and as a watchdog, and its potential for future leadership. Section two also discusses exclusion and diminishment of the rights of the First Peoples of the Great Lakes to their waters, whose practices have much to teach us about the protection path we must take. This calls for immediate remedies.

While writing this report we constantly had to revise section three, “Stresses Building into the Next Millennium.” Impacts we were assigning to the future are now upon us. The Great Lakes are being subjected to rapid social, economic and climate change.

Our research into growth in the Great Lakes revealed some disturbing trends. Many of the threats for water withdrawals are coming from within the Great Lakes from municipalities projecting growth beyond what nature’s water budgets supply. The demands from these areas could cumulate to have the same impacts as large-scale diversion proposals. We explore watershed planning and other land-use planning options as tools for true sustainability and appropriate growth in the Great Lakes basin.

Some of the changes that threaten the waters of the Great Lakes are driven by global forces. This makes it increasingly difficult for residents of the region to influence them. The regional decision-making that we have relied on in the Great Lakes to foster ecosystem protection may be at risk as governments divest much of their agendas to outside economic interests. We discuss the current trend toward privatizing water services and analyze what we might expect from the multinational water companies now seeking contracts in our region.

In the debates leading up to the passage of the free trade agreements, the Canadian Environmental Law Association and Great Lakes United were among the first environmental organizations to raise concerns about the impacts of these agreements on our water resources and our ability to control them regionally. As our report shows, we now see troubling contradictions between the Great Lakes Charter, water protection laws, and those trade agreements. These conflicts will be aggravated as soon as the next water crisis surfaces in North America.

As we approach the next millennium, the Great Lakes community will face a moral dilemma of its own making. It will be called upon to share the waters that it has undervalued and wasted at a greater per capita rate than any other region in the world. In section three we discuss how to reverse this behaviour,

take public leadership in balancing our Great Lakes water budget, and prepare our region for future demands to share our water wealth.

Nowhere is our neglect and our mistaken belief that we can control our future more evident than in the impacts of climate change in the Basin. Governments are now gauging impacts manifesting themselves in the Great Lakes that they did not predict a decade ago. The complexity of these impacts on the Great Lakes web of life is not well understood. We document how the diminishment of water levels from climate change, though not yet serious, could have a dramatic effect on the economic, cultural, social, and natural wellbeing of our region.

In our recommendations, “Sustaining the Great Lakes,” we set out a plan and a plea for residents of the Great Lakes to campaign for a sustainable water conservation strategy that addresses all the influences and stresses on the waters of the Great Lakes and St. Lawrence River ecosystem.

Our strength is in the regional voice our community has fostered. If we do not take up this concerted campaign now, we will pass on a much diminished legacy—full of conflict—to future generations who live in the Great Lakes. Belying our bounty will ensure that it will soon be lost to us all.

Sarah Miller

Co-Chair, Sustainable Water Resources Task Force  
Great Lakes United

#### NOTE TO READERS

The primary principles guiding the judgments we make throughout this report are:

- We must protect all parts of the ecosystem, including the fish, birds, animals, and wetlands.
- We must learn from the wisdom of the First Peoples of the Great Lakes and recognize their rights. Therefore we must fully include them in decision-making.
- We must live within the capacity of the waters naturally available within the watersheds where we live.
- We must take into account the interconnections between water quantity and water quality problems.



## Summary

The vast quantities of waters in the Great Lakes—20 percent of the freshwater in the world—deceive us into thinking that we have limitless supplies of water that will last forever. We think of water as a renewable resource, unlike coal or oil reserves that will be depleted, but actually only one percent of the waters of the Great Lakes are renewed each year. The other 99 percent was stored here at the time of the last glacial melt, almost twenty thousand years ago, and gradually renewed over time. Only the top 75 centimetres or 30 inches of water in the Great Lakes is renewed each year.

We must adjust our understanding of the Great Lakes ecosystem to recognize that water is not a limitless renewable resource. We also must recognize the widespread ramifications of actions in one part of the Great Lakes Basin on distant parts of the Basin. For example, the dredging of the St. Clair and Detroit Rivers has resulted in the waters of Lakes Michigan and Huron dropping by 40 centimetres or 16 inches.

This deepened understanding helps us recognize the need to consciously make decisions about how the waters of the Great Lakes are used. The following principles should be the primary bases that guide our judgments when making decisions that affect the levels and flows of the Great Lakes. We must:

- Protect all parts of the ecosystem, including the fish, birds, animals and wetlands
- Learn from the wisdom of the First Peoples of the Great Lakes and recognize their rights. Therefore, we must fully include them in decision-making.
- Live within the capacity of the waters naturally available within the watersheds where we live.
- Take into account the interconnections between water quantity and water quality problems.

### THE USE OF GREAT LAKES WATER

Ninety-four percent of the water withdrawn from the Great Lakes for human use is taken by hydroelectric power plants. Almost all of it is returned to the lakes, but hydro's use of water seriously disrupts the natural flows and levels of the rivers and lakes and thus affects downstream users, both people and wildlife.

The quantities of water consumed by human activities are small by comparison with hydroelectric use, but they are extremely significant because much of the water used by humans is permanently lost to the Great Lakes through evaporation, incorporation into products or other processes. This is called water consumption.

In 1992 agriculture was the largest consumptive use of water. This water is used for both drinking water for livestock and irrigation of crops. The next largest consumptive use was for public water supplies, operated primarily by municipalities, for residential, commercial, institutional and industrial uses. Almost as large was use by manufacturing and mining operations using their own water supply systems, and self supply for household purposes.

Our water consumption is increasing rapidly. In 1975, the International Joint Commission predicted that water consumption in the Great Lakes will increase three to seven times by 2035. The IJC estimates that such an increase will result in drops of a third of a metre or one foot in the water levels of Lakes Michigan, Huron and Erie.

### GREAT LAKES DIVERSIONS

Diversions out of the Great Lakes permanently lower the levels of the lakes. This results in significant

environmental, social and economic harm.

At present more water is diverted into the Great Lakes than is diverted out of the lakes. The Long Lac and Ogoki diversions from James Bay and Hudson Bay into Lake Superior are almost 75 percent larger than all current diversions out of the Great Lakes. These diversions have been in operation since the early 1940s.

The largest diversion of water out of the Great Lakes is the Chicago diversion, which takes water from Lake Michigan and discharges it to the Mississippi River system. This diversion has been a source of controversy ever since it began in 1900. Periodically proposals arise to increase this diversion. For example, during the drought in the U.S. Midwest in the summer of 1988, several government officials proposed to triple the size of this diversion.

Major schemes repeatedly arise to divert the waters of the Great Lakes Basin. As the groundwater is mined at a rapid rate, the groundwater is being seriously depleted in the High Plains of the United States (the Ogallala Aquifer), California, the southwestern United States, Mexico City and the Valley of Mexico. As water sources throughout the continent are depleted, the grand schemes that thus far have been set aside will become much more viable and the need for them ever more compelling.

Smaller diversion proposals arise more frequently. Currently Crandon Mining Company wants to divert water from Lake Michigan at its proposed mine near Crandon, Wisconsin, and discharge it to the Mississippi water basin. Akron, Ohio, also currently has a proposal to divert water from Lake Erie to supply drinking water to the expanding suburban development just beyond its borders.

Research by Great Lakes United showed the likelihood of high demands for diversions to communities just beyond the edges of the Great Lakes Basin to support growth in the Kenosha-Pleasant Prairie (Wisconsin) area, the Lowell-Gary-Hobart (Indiana) area, the Waukesha-New Berlin-Milwaukee (Wisconsin) area, the Akron-Cleveland (Ohio) area, and the Chicago area. These numerous

diversions, even if individually small, could add up to a substantial amount of diversion of waters from the Great Lakes.

## GOVERNMENT ACTIONS

On February 10, 1985, the governors and premiers in the Great Lakes states and provinces signed the Great Lakes Charter. The purpose of the charter was to institute mechanisms to protect the Great Lakes from diversions and to strengthen the ability of the Great Lakes states and provinces to collectively and individually protect their shared water resources. Unfortunately, the charter has failed to achieve its original intent. The governments in the Great Lakes Basin still act primarily in their own narrow, short-term self-interest.

To make the Charter a more satisfactory instrument to help address Great Lakes water quantity issues, we must:

- Make the charter binding.
- Include parties such as the First Nations and Tribes, the International Joint Commission and the federal governments as parties to the charter.
- Lower the trigger level for consideration of diversions and consumptive uses from 19 million to 3.8 million litres (5 million to 1 million gallons) per day.
- Develop a basinwide water resources management plan.

Each state and province in the Great Lakes Basin has a unique water management regime. Not only do the controls vary, but, even more significantly, some jurisdictions have very few controls over the consumption and diversion of water. None of the states or provinces has developed a comprehensive water conservation strategy.

Unless we set an example for areas outside of the Great Lakes Basin in wise water management, we cannot ethically or persuasively argue that others should learn to live with less. By not proceeding with

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# The dredging of the St. Clair and Detroit Rivers has resulted in the waters of Lakes Michigan and Huron dropping 40 centimetres or 16 inches

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aggressive programs to sustain the lakes, we force future generations into a situation where diversions of Great Lakes waters are inevitable.

#### THE INTERNATIONAL JOINT COMMISSION

This body, a U.S.-Canada treaty organization addressing boundary issues across the continent, has a powerful role in the control of the movement of waters through the Great Lakes system.

It has quasi-judicial powers in approving or withholding approval of applications for the use of structures such as channel changes, locks, powerhouses or dams, or the diversion of waters that could affect levels or flows in the international waters of the Great Lakes Basin. But this role is severely limited. The IJC cannot address Lake Michigan tributaries to the Great Lakes because they are not in international waters. This means the IJC has no role in diversions such as the one at Chicago from Lake Michigan. The IJC has played a significant investigative role on water quantity issues. It has carried out several excellent studies on water levels, quantity, consumption and diversions in the Great Lakes. However, the IJC has clearly pointed out the limitation in its ability to affect how water quantity issues are addressed through this process. The IJC has said that its recommendations are “not binding on the governments, and can be modified or ignored.”

The IJC is in a unique position to play a lead role in urging proper and serious response to the water levels, quantities and diversions issues in the Great Lakes. It has the experience and skill to adopt a basinwide, ecosystem approach to the issue.

The Canadian and U.S. governments should make a reference to the IJC to ask it to take a leadership role in developing a basinwide Sustainable Great lakes Water Strategy.

In addition, the IJC should ensure that decisions that it makes on controls and diversions take into account basinwide and long-term needs.

The IJC should also ensure that the public is fully involved in its decision-making processes on controls and diversions.

#### THE FIRST PEOPLES OF THE GREAT LAKES

The changes that the Europeans have wrought on the levels and flows of the waters of the Great Lakes Basin have had devastating impacts on the First Peoples of the Great Lakes, who arrived here approximately ten thousand years ago. The natural flows of the waters have been disrupted, resulting in the destruction of much of the natural habitat and the rich diversity of life in the Great Lakes Basin that the First Nations and Tribes have traditionally depended on. The construction of the St. Lawrence Seaway has separated some of the First Nations and Tribes from the waters that are their lifeblood.

The First Peoples of the Great Lakes have a very different worldview from that of the Europeans who colonized North America in the sixteenth century. In their view “Earth is my mother and the animals, plants and minerals are my brothers and sisters.” This means that the Earth and everything in it must

be approached with respect and awe.

During the 1800s, many of these peoples entered into treaties with the United States, Britain and Canada by which they ceded major parts of their lands to the Europeans. However, they did not see this as meaning that they had ceded away their sovereignty and their rights to enjoy the blessings that the Great Lakes bring. Their fight to preserve and restore their sovereignty and rights has been an ongoing area of conflict.

One of the critical rights that the First Nations and Tribes have maintained is the right to use of water. Even though the courts in both the U.S. and Canada have confirmed First Nations rights to the use of water, the implications of this right continue to be disputed or ignored. One difficult aspect of this problem is that, if sovereignty is to be meaningful, its exercise has implications far beyond the lands that are still held by the Tribes and First Nations. Water does not start and stop wholly within any jurisdiction’s territory. First Nations rights to the unimpeded flow of clean, life-filled water affects most of the Great Lakes region.

Although their rights seem clear, the First Nations and Tribes have had great difficulty in asserting their

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“Earth is my mother  
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rights and in persuading the rest of society to acknowledge those rights and take into account the special relationship of the First Nations to the waters of the Great Lakes when they make decisions. This means that we must:

- Recognize that the traditional practices of First Nations and Tribes have much to teach non-native communities about sustaining our waters.
- Recognize the rights of First Nations and Tribes to the waters of the Great Lakes and work to ensure that these rights are restored and that future decisions foster these rights.
- Consult with First Nations and Tribes on all matters affecting levels and flows and give them the power to veto actions that would negatively affect their spiritual, cultural, physical and economic wellbeing.
- Ensure that representatives chosen by the First Nations and Tribes are equal partners with the U.S. and Canadian governments on all bodies that make decisions affecting Great Lakes levels and flows.

## STRESSES ON THE GREAT LAKES

### Growth

Most government jurisdictions, including municipalities, do not recognize limits to growth, wanting more residential subdivisions, shopping malls, and industrial “parks” to pop up on the edge of town. This means that they need more water to serve these expanding uses. If local supply is inadequate, they often look to divert water from somewhere else. As a result, the water diversion issue is really a development issue. Rather than defining the problem as a lack of water, it is necessary to recognize that the problem is excess or misplaced growth.

The most important element of sustainable water management is the entrenchment of the understanding that settlement should be limited to where water supplies exist. It is not an acceptable solution to water shortages in a region to pipe it

from somewhere else. Sustainability means leaving our pipe dreams in the past and properly managing the water resources available in any given region.

A primary component of this is wisely using the water we have. Instead of always looking for new water sources, we should focus on reducing the demand for water through conservation measures. Canada and the United States have the highest per capita use of water in the world. Water use levels in other countries demonstrate that it is quite realistic to set a goal of 50 percent reduction in per capita use of water in Canada and the United States by 2005.

Human growth and development also interfere with the natural replenishment of the waters of the Great Lakes by diverting waters from their natural pathways and by contaminating the waters. Alternative methods of stormwater and wastewater management should be used that avoid these problems.

We must change our focus toward reducing the amount of water we use, ending interference with nature’s water cycle, and cleaning up the waste we produce before it is released.

We also need to change from our short-sighted perspective that tries to control the waters of the Great Lakes solely for human benefit to one that accommodates the ecosystem’s cycles, attempting to sustain all Great Lakes communities—human, bird, fish and wildlife.

### Economics

Millions of dollars have been spent on water supply and treatment with little thought being given to how efficiently water is used. Large projects have often led to increased energy use, environmental degradation, and added national debt and consumer spending. One factor that has fostered this situation is the fact that water users in the Great Lakes Basin rarely pay the full cost of the water supplied to them. In Ontario, for example, user fees are only half of what is needed to maintain the water supply system in the long run.

Water is extremely cheap in Canada and the United

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States. For example, water users here pay only one-quarter the amount for each unit of water as do users in Germany. As a result, water users have little incentive to economize on their use of water and wastewater services.

Economic instruments have a critical role to play in achieving water conservation. For example, real cost pricing should be applied to all types of users to encourage all users of water to maximize their efficiency in the use of water and to ensure that one user is not subsidizing another. Mechanisms should be put into place that ensure that the poor are not hurt by the added costs created when real cost pricing is instituted.

Increasingly around the world, water services, once provided solely by government, are being privatized. This trend has now come to the Great Lakes Basin. But privatization of water supply services creates numerous problems:

- Privatization moves profits away from the water system.
- Privatization does not support conservation.
- Privatization usually leaves taxpayers with the financial risks, especially in joint government-private sector arrangements.
- Privatization ignores broader policy issues.

The experience since the water supply system in England and Wales was privatized in 1989 has been disastrous.

### **Free Trade**

The Free Trade Agreement between Canada and the U.S., and the North American Free Trade Agreement among Canada, Mexico and the U.S. facilitate the flow of "goods," including water, across the North American continent. Free trade is an essential component of the privatization of the ability to profit from the sale of resources, because it breaks down the boundaries of where profits can be made. In this situation water has become another saleable commodity like wheat, lumber and copper, which will bring prosperity to those lucky enough to have control over an excess supply.

Given the existing distribution of water on the continent, exports of water are most likely to come from the Great Lakes. Free trade has serious implications for attempts to prevent diversions from the Great Lakes. The ability of governments to act through the Great Lakes Charter, the imposition of

special taxes on water use, the use of subsidies to help water users convert to conservation methods—all these are placed into serious doubt by free trade. These powers can now be challenged under NAFTA because government actions may not favour their own residents to the disadvantage of people outside of their jurisdiction. The threat of a challenge under trade agreements may well be enough to discourage governments from even trying to proceed with such programmes.

Under NAFTA, when water is exported, the proportion of the total water output

available for export must be maintained at a relatively constant rate. Any attempt by an exporting country to limit exports of water must be met by a proportional decrease in domestic consumption.

Under free trade, once we turn the tap on, we cannot turn it off.

### **Climate Change**

Climate change is not a speculative issue; it is a reality that is now happening in the Great Lakes region.

Scientists predict that, if CO<sub>2</sub> concentrations double by the year 2100 as is now predicted, climate change will have the following impacts on the Great Lakes Basin:

- Temperature increase of 9.1 degrees centigrade or 15 degrees Fahrenheit.
- Lake levels decreased basinwide by one metre or over three feet and in Lake Michigan by 2.5 metres or 8 feet.
- Loss of wetlands and the concomitant loss of essential habitat.
- Loss of forests, especially the boreal forests north of Lake Superior.
- Loss of cold water fish.
- Decreased water quality because of the resurfacing of buried contaminated sediments.

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**In less than 40 years,  
the flow from the  
Great Lakes system into  
the St. Lawrence River  
will have been  
reduced a quarter**

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- Increased human health problems, including diseases now unknown in the Great Lakes region such as malaria.
- Increased crop damage; decreased shipping because of low lake levels.
- Losses to industries such as breweries, the chemical industry and hydropower generators that are highly dependent on water.

Despite these impacts on the Great Lakes, this region will still be water rich in comparison with other increasingly parched parts of the continent. Water diversion schemes that have been dropped in the past because of their great expense will no longer look so unreasonable. Diversion schemes are likely to grow ever more grand.

Climate change will also increase the number of people who will leave their homes to seek greener pastures. The Great Lakes will probably become one of the prime destinations for such people. The IJC has estimated that climate change could result in millions of new residents moving into the Great Lakes Basin.

In 1992, in order to reduce climate change effects, Canada and the United States, along with 130 other countries, committed to reduce their CO<sub>2</sub> emissions to 1990 levels by the year 2000. Regrettably, they do not appear to be on track to achieve this target. Canada is predicted to have an increase in emissions of 12.5 percent by 2000; the United States is predicted to have an increase of 3 percent.

We must act now to dramatically reduce our activities that are producing greenhouse gas emissions. We also must confront the reality that climate change is occurring and will result in dramatic drops in water levels in the Great Lakes. We need to institute conservation measures that will help us to live with less water. We also must ensure that in times of scarcer water supplies we balance our needs with those of the fish, birds and animals for whom the Great Lakes Basin is also home.

## **SUSTAINING THE GREAT LAKES**

If we consume water at currently projected growth rates, and if projected impacts of climate change occur, Great Lakes water levels will drop dramatically.

In less than forty years from now, the flow from the Great Lakes system into the St. Lawrence River will have been reduced to less than three-quarters of its current flow. This is without taking into account the compounding impact that diversions out of the Great Lakes could have on the levels and flows of the lakes.

If we allow these changes to occur, the Great Lakes will be very different from the home we now live in. Our health, our cultures and our economies will all be substantially changed. The impacts on fish, birds and wildlife will be even more dramatic. Water use conflicts will escalate.

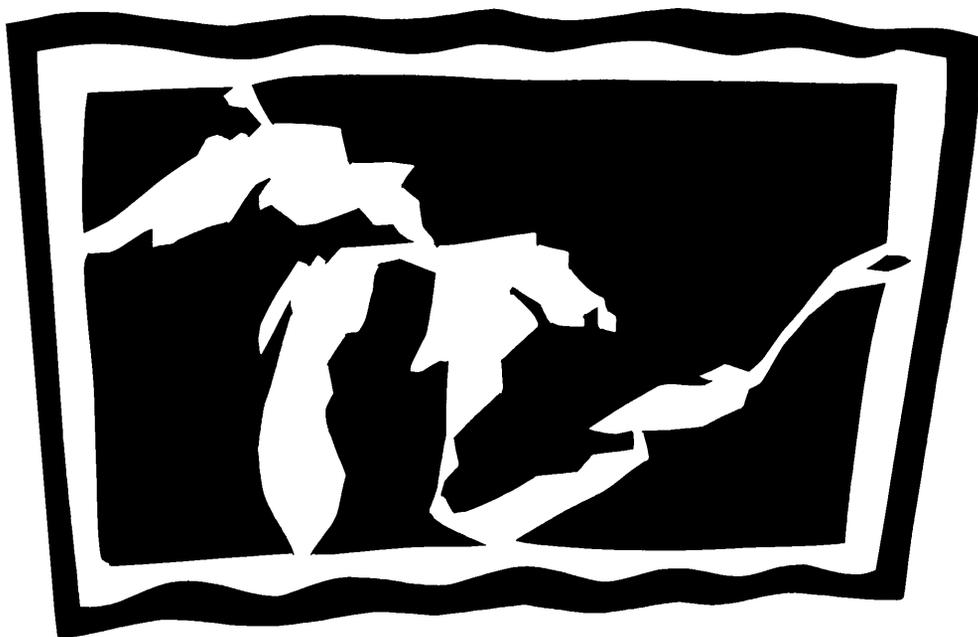
To prevent these effects, we must tackle the problems that will cause them now. A fundamental first step is the development of a basinwide Sustainable Great Lakes Water Strategy. This plan should include:

- A water conservation strategy.
- Plans to reduce the impacts of agriculture, the power industry and the mining industry on water levels and flows.
- Guidelines for communities to live within the water supplies available within their watershed.
- A determination of ways to avoid the negative impacts of privatization of water services, of free trade and of diversions.

This strategy must be developed by the IJC or the governments in full cooperation with the First Nations and Tribes, the public, and municipalities. Each government should adopt the strategy in a way that makes it legally binding and by changing their laws, regulations and programmes to ensure that the strategy is carried out.

We also must recognize that the Great Lakes cannot be separated from the rest of North America. Therefore, we must act with those concerned about these issues throughout Canada, Mexico and the United States.

Fundamental to sustaining the waters of the Great Lakes is a profound change in our attitudes. We must recognize that water is not just a resource and a commodity to be bought and sold. The waters of the Great Lakes are the vital lifeblood of the Great Lakes Basin upon which all the Basin's residents depend—the birds, the fish, the wildlife and humans.



## The Ins and Outs of the Lakes





## The Sweetwater Seas

Water is generally thought of as a renewable resource, limitless because it naturally regenerates itself. The vast quantities of water in the Great Lakes easily lead us to believe in the limitless nature of water.

But each year only 1 percent of the water in the Great Lakes, about 75 centimetres (30 inches) is actually renewed.<sup>1</sup> This is the annual amount of water added to the Great Lakes each year by rain, snow and runoff minus evaporation from the lakes. The other 99 percent of the water in the lakes is a gift originally stored here at the time of the last glacial melt, almost twenty thousand years ago, and gradually renewed over time.

To understand Great Lakes water quantity and levels issues, we must understand the ecosystem and hydrological cycle of the Great Lakes.

### THE DIMENSIONS OF THE LAKES<sup>2</sup>

Only 2.7 percent of the earth's water is fresh; almost 20 percent of this freshwater is in the Great Lakes, the largest system of fresh surface water on the globe. In total, the Great Lakes hold a volume of about 23,000 cubic kilometres (5,500 cubic miles) of water.

The Great Lakes comprise a single interconnected system, but each of the lakes has its own distinct

characteristics. For example, Lake Superior, the largest of the lakes, reaches to a depth of 406 metres (1,332 feet) at some points, and has a highly stable shoreline on its north shore. Lake Erie, on the other hand, the smallest Lake, has a maximum depth of only 64 metres (210 feet), and is subject to a great deal of shoreline erosion and storm-induced water level changes.

Water flow in the Great Lakes system begins in Lake Superior, moves progressively through Lakes Michigan and Huron (which behave as one due to the large connecting Straits of Mackinac), Lake Erie, Lake Ontario, and the St. Lawrence River. Finally the fresh waters of the Great Lakes mix into the salt waters of the Atlantic Ocean.

Anything that happens upstream, such as water loss or pollution, has effects downstream. For example, the endangered beluga whales in the St. Lawrence River carry evidence in their bodies of upstream pollution. Autopsies reveal the presence of many toxic chemicals in belugas, including mirex, which is found primarily in Lake Ontario.<sup>3</sup>

The Great Lakes watershed, that area drained by the Great Lakes and their connecting rivers, is only twice the size of the surface area of the lakes. This is smaller in comparison to the size of the lakes than the watersheds for most lakes. As a result, the large

surface area of the lakes makes up a major part of the catchbasin for the deposition of rain and snow.

Because the volume of the Great Lakes is so large, their *retention time*, the time that a drop of water remains in a lake before draining out, can be quite long. Lake Superior's retention time is 191 years; Lake Michigan's retention time is 99 years. Lake Erie's retention time, by contrast, is only 2.6 years.

## THE CYCLING OF GREAT LAKES WATER<sup>4</sup>

The waters of the Great Lakes are constantly in motion. This movement, which is called the *hydrological cycle*, is essential for the survival of all life in the Great Lakes Basin.

### Evaporation

*Evaporation* from the surface of the watershed occurs as water comes into contact with dry, relatively warm air, and forms water vapour. This vapour can remain as a gas or condense in the air to form clouds or fog. Evaporation is greatest when the differences between air and water temperature are greatest. The timing of this peak varies by lake. For Lake Erie, peak evaporation occurs in October; for Lake Superior, peak evaporation occurs in December.

Because the lakes are so large, their surfaces release a great deal of water into the air. The lakes vary a great deal in this respect, however. A shallow, warm lake, like Lake Erie, experiences a great deal more evaporation than a deeper, colder lake, like Lake Superior. Water also evaporates from vegetation, soil, streams, ponds, and smaller lakes.

The Great Lakes watershed is located within the global hydrological system; although the Great Lakes system loses water to different regions, moisture also enters the Great Lakes watershed from around the globe, especially from warmer areas such as the southern United States and the tropics.

### Precipitation and Runoff

The water vapour in the atmosphere falls into the Great Lakes Basin as rain, snow, hail or sleet, either falling directly onto the surface of the lakes or being added to the lakes as runoff from the drainage basin. Annual precipitation in the Great Lakes Basin varies from 60 to 130 centimetres (24 to 50 inches); the

average annual precipitation is 81 centimetres (32 inches). In times of increased precipitation, the outflow from the lakes does not increase proportionately; during such periods, the lakes store more water, causing increased water levels.

Once water falls to the surface, it can take a number of different paths. The water may quickly vaporize, be absorbed by plant roots, or simply fall to the surface waters of the Great Lakes. If the water falls to the land of the Great Lakes Basin, it will either percolate down through the soil and become groundwater or will become surface runoff, eventually making its way to a stream or lake.

A number of factors determine whether the water that falls will become groundwater or runoff. The more porous the surface of the land, the more easily water can infiltrate and become groundwater. On sand or gravel, 40 to 50 percent of the rain and snowmelt may infiltrate, while less porous materials such as clays may let only 5 to 20 percent of the water seep through. Flatter areas absorb more water, as opposed to sloped areas, where more runoff occurs. Areas with more vegetation have less runoff as the water is held by the roots of the plants and trees. Finally, human-induced changes such as deforestation, agricultural practices, and settlement, can increase runoff, as has occurred noticeably in the Great Lakes since the 1930s.

### Groundwater

Groundwater is essential for the replenishment of Great Lakes surface waters. Although groundwater movement is not well understood, its basic patterns can be described. Water seeping down through soil continues on its downward path until it fills all the pore spaces within the soil or rock; this accumulation of subsurface water is referred to as groundwater. The top of this area, the saturated zone, is called the *water table*; below this level, water is available for wells.

Groundwater usually travels from highland zones, where it is recharged, to lowlands, where it is discharged into streams, marshes, ponds and lakes. Groundwater is slow moving and crucial to the functioning of the whole system. The groundwater system can act as a reservoir during times of flood, and helps to maintain the integrity of wetlands.

Although there is uncertainty as to what

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Only 1 percent of  
the waters of the  
Great Lakes  
is renewed each year

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percentage of Great Lakes water is fed by groundwater sources, it is thought to make up more than half the water entering the lakes from rivers and streams on the United States side of the watershed. Different geological conditions on the Canadian side of the watershed make the estimates much lower, just below 20 percent. These flows are included as part of the runoff calculations to the Great Lakes.

### **The Net Basin Water Supply**

The net supply of water in the lakes is derived by calculating the precipitation directly to the surface of the lakes, adding runoff to the lakes, and subtracting evaporation from the surface of the lakes.

The hydrological cycle varies substantially by lake, resulting in quite different factors in the net water supply. For example, in Lake Erie 51 percent of the water in the cycle disappears from the lake through evaporation. By contrast, only 26 percent of the water added to Lake Ontario by the hydrological cycle leaves the lake that way.

The other major factor in water flow through the lakes is the flow from upstream lakes to downstream lakes. Lakes Superior and Michigan are not affected by this. In Lake Huron, 1.2 times as much water enters the lake from Lakes Superior and Michigan as enters the lake from runoff and precipitation. In Lake Erie, the inflow from upstream is 3.6 times as high as from runoff and precipitation. In Lake Ontario, inflow is 3.8 times as high.

Outflow from the lakes is greater than inflow. In Lake Huron, for example, outflow into the St. Clair River is 1.4 times as high as the inflow from Lakes Superior and Michigan.

## **INFLUENCES ON LAKE LEVELS**

### **The Hydrological Cycle**

The hydrological cycle has a large impact on the amount of water that makes its way into the Great Lakes; this in turn determines how high the lakes are. For example, the record high Great Lakes water levels in late 1985 and in 1986 followed unusually high rates of precipitation in 1985.<sup>5</sup> Water levels fluctuate an average 30 to 46 centimetres (12 to 18 inches) a year.<sup>6</sup>

### **Weather Conditions**

Storms can cause lake levels to fluctuate significantly. Strong winds can cause the levels at one end of a lake to decrease and levels at the other end to increase.

This is known as *wind set up*. Although these episodes are short-lived, they can cause a lake to rise by up to 2 metres (6.5 feet). In another relatively common occurrence on the Great Lakes, called *seiche*, the water from a lake piles up at one end because of changes in barometric pressure and wind.<sup>7</sup>

Global warming will also affect lake levels. Increased temperatures in the watershed will result in higher evapotranspiration from the land, increased evaporation from the lakes and reduced runoff from land and tributaries. The cumulative effect of all these patterns will be the lowering of Great Lakes water

levels. This is discussed in greater detail in chapter 11.

### **Geologic Forces**

The earth's crust below the Great Lakes is rebounding after the removal of the tremendous weights exerted by the mile-deep ice of the last glacial period. The land on the northern and eastern shores of each lake is rising. As a result, water levels on the southern and western sides of each lake are rising relative to the rest of the lake. For example, the water levels at Duluth are expected to rise by 15 centimetres (half a foot) in the next fifty years.<sup>8</sup>

### **Human Activities**

Human activities also affect lake levels. Water diversions into and out of the Great Lakes Basin and within the Basin, consumption of water, the construction of dams and canals, and dredging affect water levels and flows. For example, experts estimate that dredging of the St. Clair and Detroit Rivers has resulted in the waters of Lakes Michigan and Huron dropping by 40 centimetres (16 inches).<sup>9</sup>

The impacts of human activities on lake levels is discussed in later chapters.

### **Wetlands**

Wetlands have an essential role to play in controlling water levels in the Great Lakes ecosystem. Wetlands are reservoirs that moderate the sometimes extreme

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**Great Lakes wetlands  
are decreasing at the  
staggering rate of  
8,000 hectares  
(20,000 acres)  
each year**

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water level changes in the lakes.<sup>10</sup> In periods of high precipitation, wetlands store large quantities of water, gradually releasing it later. In periods of normal or low precipitation, wetlands are discharge areas, which maintain the water levels of water bodies in the Great Lakes Basin.

Wetlands are also important areas for groundwater recharge. They trap water and allow it time to seep deep into the ground to replenish aquifers.

Because wetlands are thickly vegetated, they act as a buffer zone for shorelines against the waves coming off the lakes. Fluctuating water levels are crucial to the vegetation of wetlands. Lower water levels provide the conditions for a number of species to emerge from buried seeds, while trees and shrubs can begin to move closer to the lakes. Higher water levels, on the other hand, open up a dense growth of cattails, trees, and shrubs. The greatest amount of diversity in wetlands is found in the areas where water levels fluctuate the most.

Wetlands are essential to the ecosystem as purifiers of water that passes through them and as habitat and spawning areas that are crucial to the maintenance of the diversity of life in the Great Lakes Basin.

Unfortunately, wetlands have been and continue to be destroyed by human activities such as the clearing of land and filling of wetlands for residential, commercial and agricultural uses. While there are at present approximately 170,000 hectares (420,000 acres) of wetlands in the Great Lakes Basin, this represents only approximately 20 percent of the original wetland area.

These Great Lakes wetlands are decreasing at the staggering rate of almost 8,000 hectares (20,000 acres) each year.<sup>11</sup>

## **WATER: A RENEWABLE RESOURCE?**

The comparatively small drainage basin of the Great Lakes means that outside sources bring relatively little water to the Great Lakes. Any substantial increase in withdrawals of water from the lakes would have serious, permanent impacts on Great Lakes water quantities, since only 1 percent of the water is naturally renewed.

The vast depths of the Great Lakes and the very slow rate of turnover of their waters (their long retention times) also contribute to the lack of renewability of Great Lakes waters. Once contaminated, it can take a very long time for them to flush out, making them safe for consumption by wildlife and humans.

For example, even if we immediately stopped putting more contaminants into the cleanest of the Great Lakes, Lake Superior, it would take almost two hundred years for the persistent contaminants now in the water, such as PCBs, DDT, and toxaphene, to flow out of the lake.

Persistent contaminants that settle into lake, bay, and tributary sediments remain in the Great Lakes system even longer. They gradually release their toxic burdens into the Great Lakes over extremely long periods.

The time it takes for contaminated groundwater to flush itself out is vastly longer. Water in most aquifers has been there since the last ice age.

We must adjust our understanding of the Great Lakes ecosystem to recognize that water is not a renewable resource. We must change our use and management of water so that we act according to this more enlightened understanding.



## Water Uses

The waters of the Great Lakes Basin are essential for all life within its boundaries. This vast basin contains a wide variety of natural habitats and is home to a rich diversity of wildlife and plants. The Great Lakes shoreline, over 17,000 kilometres (10,000 miles) long,<sup>1</sup> harbours 131 animal and plant species that are critically imperiled, imperiled, or rare on a global scale.<sup>2</sup>

The Great Lakes are also home to over 33 million people.<sup>3</sup> One-quarter of Canada's population lives in the Great Lakes Basin; less than 10 percent of the U.S. population lives in the Great Lakes Basin. This results in Great Lakes issues having a higher national profile in Canada than in the United States.

In this chapter, we describe human uses of the waters of the Great Lakes.

### INFORMATION SOURCES

The information in this chapter is based on the *Annual Report of the Great Lakes Water Use Data Base Repository*.<sup>4</sup> This is the only source that brings together comparable information from all Great Lakes and St. Lawrence River jurisdictions.

This database has three major limitations:

- The most recent data is for 1992.
- It is difficult to compare water usage between

- jurisdictions because there are inconsistencies in how different jurisdictions gather data.
- Michigan's reporting system is still incomplete.

Despite these weaknesses, the *Annual Report* provides the only reasonably comprehensive information available.

### WATER SOURCES

The *Annual Report* identifies three main types of water sources:

- "Great Lakes surface water" from the Great Lakes, their connecting channels and the St. Lawrence River.
- "Other surface water" from tributary streams, lakes, ponds, and reservoirs within the Great Lakes Basin.
- "Groundwater," which refers to all subsurface water.

The surface waters of the Great Lakes Basin are the source of drinking water for approximately 80 percent of the residents of the Great Lakes Basin. Surface water is also the primary source of water for industrial uses (manufacturing and mining), thermo-electric (fossil) power production, thermo-electric (nuclear) power production, hydroelectric power

production, and public supply uses (for those who do not supply their own water). Surface waters are also critical for recreational and navigational purposes.

Groundwater is the primary source of water for self-supplied residential, industrial and commercial uses.\* Approximately 21 percent of the residents of the Basin depend on groundwater for drinking either from self-supplied systems or municipal water supply systems.<sup>5</sup> Groundwater is the primary source for irrigation and livestock watering.

## WATER USAGE

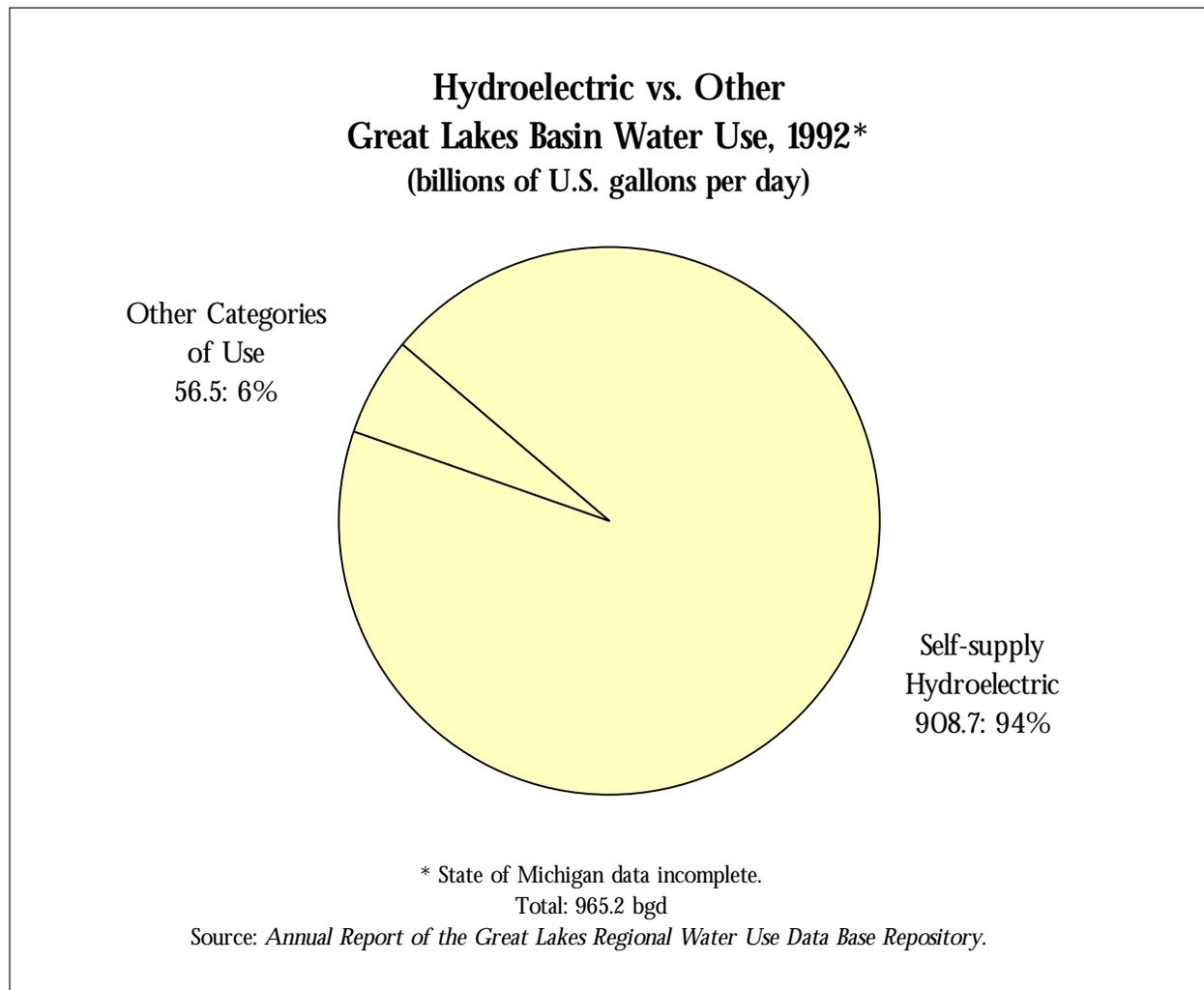
Because the economies, industries, and geographies of Basin jurisdictions differ, each Great Lakes state and province has its own pattern of water usage. However, some generalizations can be made. The *Annual Report*

distinguishes between water withdrawals and water consumption:

- A *withdrawal* is “water removed from the ground or diverted from a surface water source for use.” Sometimes this is referred to simply as “use.”
- *Water consumption* is defined as “that portion of water withdrawn or withheld from the Great Lakes and assumed to be lost or otherwise not returned to the Great Lakes Basin due to evaporation, incorporation into products or other processes.”

## Water Withdrawals

In 1992, water withdrawals from the Basin were approximately 3,650 billion litres per day, equivalent to 965 billion gallons per day. This is more than six times the average daily outflow from Lake Ontario into the St. Lawrence River.



\* *Self-supplied* water uses are those where the water is withdrawn by the user and not procured through a public water supply.

Of the water withdrawn from the Great Lakes Basin, 68 percent came directly from the Great Lakes, the channels that connect them, and the St. Lawrence River. About 31 percent came from other streams, lakes and rivers within the Great Lakes Basin. Less than 1 percent came from groundwater. (The Great Lakes Water Use Data Base does not break down consumptive use by source. The percentage of consumptive use from groundwater would be substantially higher than 1 percent.)

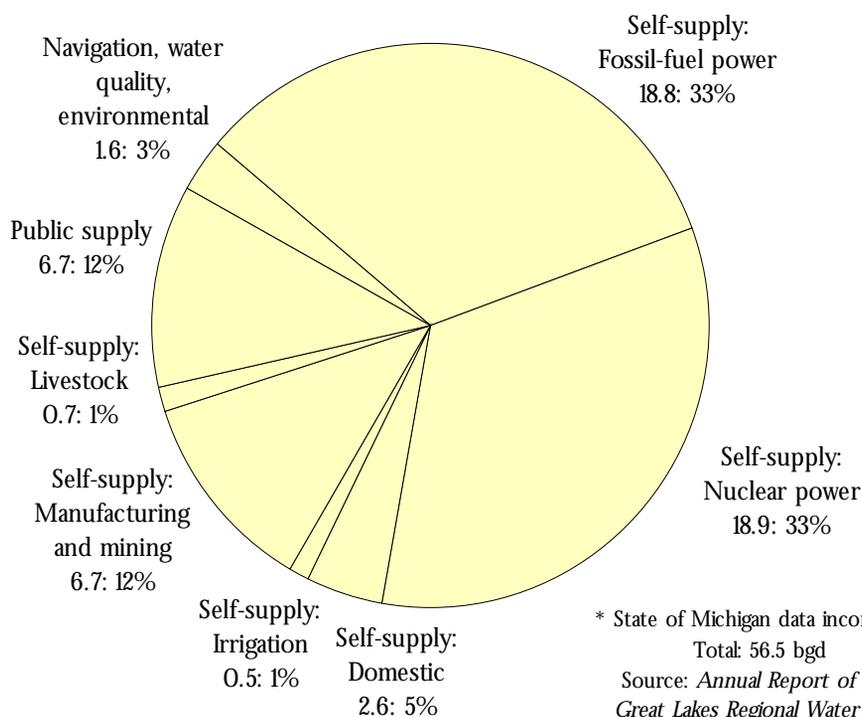
Ninety-four percent of Basin water withdrawals were for hydroelectric power generation. Minuscule amounts of water are actually consumed through the hydroelectric power generation process.

Ontario, Québec, and New York are by far the largest users of water in this category. Pennsylvania does not use any Great Lakes Basin water for hydroelectric power generation.

Just because hydroelectric power does not consume much water does not mean that it has no impact on water quantity issues. Hydro projects have serious impacts on water resources through the construction of dams, the diversion of water flows, and the inundation of land with water. The displacement of water for hydropower use has substantial impacts on the flow downstream. Anyone who has seen the water trickling over Niagara Falls at sunrise, before the power companies cut back on their water intake in order to make the falls more scenic, can attest to this dramatic impact.

Even though most of the water used in the Great Lakes Basin is returned to the Great Lakes system, returned water is usually diminished in quality. Water returned by hydropower systems is usually hotter than normal and, therefore, affects downstream habitat. Water returned from other uses may be contaminated

### Great Lakes Basin Non-Hydroelectric Water Use, 1992\* (billions of U.S. gallons)



\* State of Michigan data incomplete.  
Total: 56.5 bgd  
Source: *Annual Report of the Great Lakes Regional Water Use Data Base Repository.*

with toxic substances from industrial and mining uses and with human and animal wastes.

The two largest non-hydro power plant users of water were also for the production of electricity: fossil and nuclear power plants.

**Consumptive Use**

In 1992, Great Lakes Basin consumptive uses amounted to 11 million litres of water per day (mld), equal to 3.1 million gallons per day (mgd), a 37 percent increase in water consumption over the previous year.

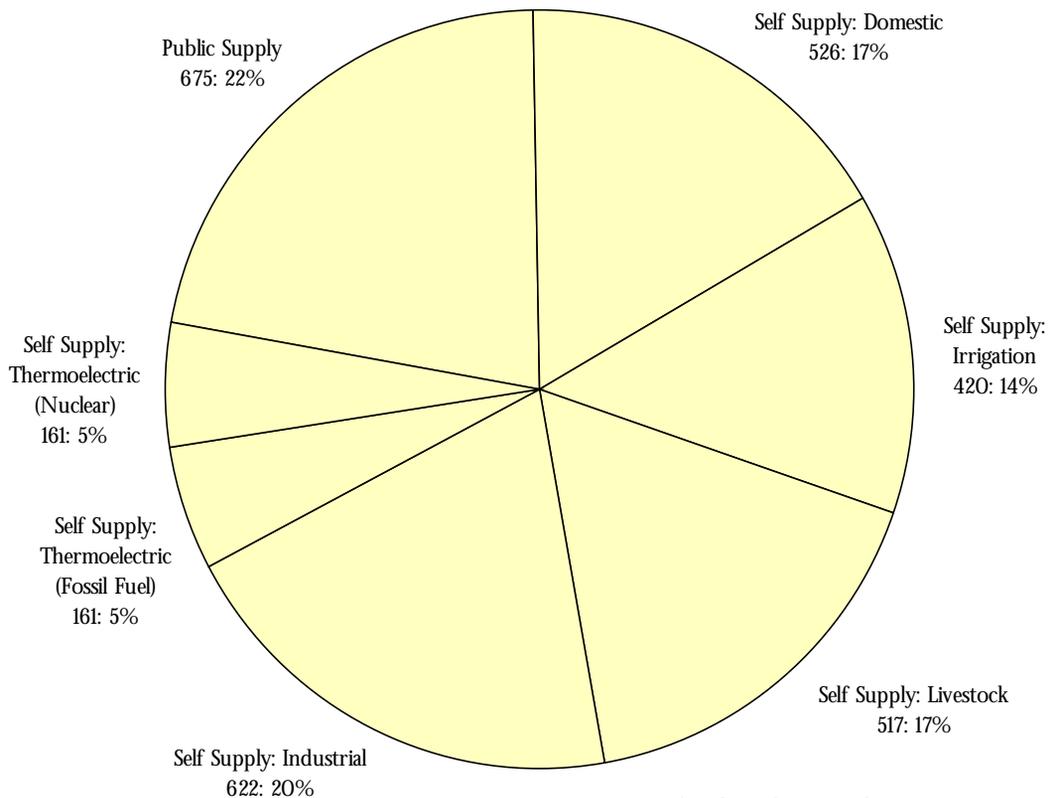
This may seem like an insignificant quantity of water compared to withdrawals for hydroelectric power. However, unlike hydro withdrawals, water taken by consumptive use is lost from the fragile ecosystem of the Great Lakes Basin.

Agriculture was the largest consumptive user of water. Water for drinking supplies for livestock and for irrigation of crops took 30 percent of the water consumed. Some of this water for irrigation was for non-agricultural uses such as watering golf courses and parks. Most of this supply came from groundwater sources.

The next largest consumptive use of water was for public supply to users who do not withdraw their own water. The uses within this category include residential, commercial, institutional and industrial public water uses. This category accounted for about a fifth of the water consumed in the Great Lakes Basin.

Almost as large was industrial use for manufacturing and mining. This accounted for approximately 20 percent of consumption.

**Great Lakes Basin Water Consumption by Category, 1992\***  
(millions of gallons per day)



\* State of Michigan data incomplete.

Total: 3,106 million gallons per day.

Source: Annual Report of the Great Lakes Regional Water Use Data Base Repository.

The other major consumptive uses were: self supply for domestic uses (17 percent); fossil fuel plants (5 percent) and nuclear fuel plants (5 percent).

Ontario, Wisconsin and Michigan took over 70 percent of the water consumed in the Great Lakes Basin. Ontario consumed 27 percent of the total, Wisconsin 26 percent, and Michigan 18 percent.

## CONFLICT OVER WATER USE

Fights over who controls the use of water and who makes decisions that affect levels and quantities of water have been common throughout history. The Great Lakes are no exception to this phenomenon.<sup>6</sup>

Even though one-fifth of the world's fresh water is in the Great Lakes, regional debates over the use of water are common because different uses often are not easily compatible with each other. The hydroelectric power plants want to be able to take limitless quantities of water out of a river to go through their generation plants. But downstream users can be negatively affected by this practice. For example, the Harbour of Montréal does not want waterflow through the St. Lawrence River restricted because it can lower waters in the harbour and, as a result, reduce access for huge ocean freighters. Removal of water from the Niagara River for power plants reduces flow over Niagara Falls, which can detract from the scenic value of the falls and hurt the tourism industry.

The most commonly recurring concerns about water levels are raised by those who live along the shores of the Basin's lakes and rivers. Some want more water diverted out of the Great Lakes Basin to avoid flood damage. Others want less water diverted and barriers or controls put on the major rivers connecting the lakes in order to keep water levels up in front of their property so that their docks and beaches are not left high and dry. Ironically, at different times the same people call for more or less diversion. The timing of the call is, of course, determined by the natural fluctuations of water levels due to changes in the amount of precipitation.

Irrigation for agricultural purposes is likely to become a source of increasing conflict among water users because such irrigation is predicted to increase. This may decrease stream flow and reservoir and groundwater levels, leading to conflict with domestic water users.<sup>7</sup>

Unfortunately, when decisions affecting water quantity and levels are made, the users given the least

attention are wildlife and plants. They are the least able to adapt to sudden changes in the way water flows through the Great Lakes system, yet their voices are the quietest.

## TRENDS IN WATER CONSUMPTION

The Worldwatch Institute estimates that water use per capita has increased by over five times in the last three hundred years.<sup>8</sup> This increase has been particularly rapid in this century. Worldwide population has increased by three times since 1900, while water use has increased by seven times.<sup>9</sup>

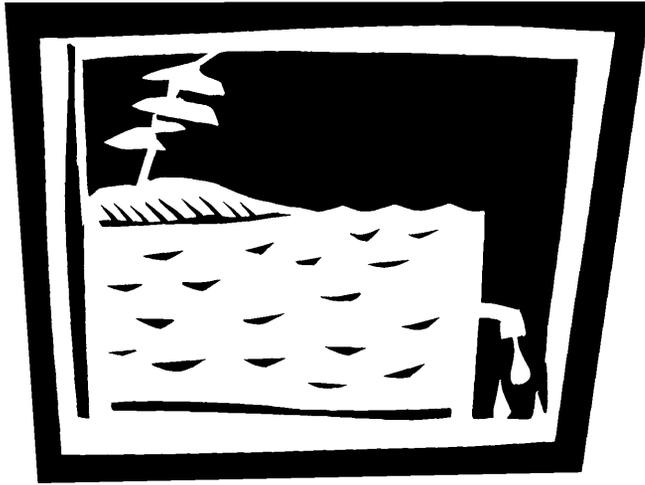
Canadian data show some interesting variations in the sources of increased use over the decade from 1981 to 1991. These data show that consumption of water across Canada increased over that decade by almost 10 percent. The manufacturing sector's consumption increased by 28 percent and the agricultural sector's consumption decreased by over 12 percent. By contrast, water withdrawn by municipal water supply facilities for consumption by domestic and commercial users decreased 26 percent.<sup>10</sup>

In 1975, the International Great Lakes Diversion and Consumptive Uses Study Board predicted that consumptive uses in the Great Lakes Basin would increase 300 to 700 percent by 2035.<sup>11</sup> Ontario's provincial government predicts that water use will increase by 2.5 percent each year in the future; this is twice the rate of expected population growth.<sup>12</sup>

The Worldwatch Institute warns that we are already withdrawing water far faster than it can be recharged, "unsustainably mining what was once a renewable resource."<sup>13</sup> If consumption continues to increase, this situation will worsen.

The International Joint Commission, a U.S.-Canada treaty body, has estimated that, if the current trends in increased water consumption continue, the outflow from the St. Lawrence River will decrease by 8.6 percent by the year 2035. The commission also estimated that increased water consumption could result in the water levels in Lakes Michigan, Huron and Erie dropping by over 0.3 metres (one foot) by 2035.<sup>14</sup>

This is only one aspect of the pressures that threaten to draw down the waters of the Great Lakes. Others include diversions out of the Great Lakes to other parts of the continent and the dramatic loss of water as a result of global warming. These are discussed in later chapters.



## Diversions

Proposals for diversion of water from the Great Lakes Basin periodically arise; they always generate great controversy. Headlines a decade apart show the heat that is generated: “Keep the plug in Great Lakes” (*Grand Rapids Press*, March 8, 1996), “Region’s governors must keep diversion to minimum” (*Ann Arbor News*, March 8, 1996), and “Feud grows over scheme to export water to U.S.” (*Toronto Star*, January 7, 1986), “Grand Canal called ‘Frankenstein’” (*Toronto Globe and Mail*, February 11, 1986), “Don’t Endanger Lakes to Aid Thirsty Big Apple” (*Buffalo News*, September 14, 1985).

### IMPACTS OF DIVERSIONS

The primary impact of diversions out of the Basin is to permanently lower lake levels. Individually, a diversion may seem inconsequential because it is small, but cumulatively the impacts become dramatic. Also, each diversion creates a precedent that makes it harder to successfully argue against additional proposals for diversions.

Permanently lowered lake levels as a result of diversions would result in significant environmental, social and economic harms.

### Environmental impacts

There are a number of environmental impacts from permanently lowered lake levels. Among them:

- Water quality in the Great Lakes could be detrimentally affected. Within the diversion route itself, there may be increases in water quality due to an increased dilution of pollutants.<sup>1</sup> However, water quality may be reduced where water levels are lowered. Lower lake levels increase the disturbance of contaminated sediments by ships and by storms. This results in the release of contaminants from the sediments, making them available to the food chain. The contaminants are, as a result, passed from fish to the birds, animals and humans who eat them.<sup>2</sup>
- Wetlands are particularly sensitive to changes in water levels. Any loss of these wetlands affects the habitat of the fish and wildlife who live there. Fish spawning areas could be seriously affected. Loss of wetlands also mean the loss of the numerous beneficial functions of wetlands, which include groundwater recharge, shoreline erosion prevention, temporary floodwater storage, and water filtration by absorption of sediment, chemicals, and nutrients.<sup>3</sup>
- Reduced Great Lakes outflow could lead to

saltwater encroachment from the Atlantic Ocean up the St. Lawrence River. This could have dramatic impacts on the freshwater ecology as well as contaminating the drinking water supply for Montréal and other communities in Québec.<sup>4</sup>

### **Social and Economic Impacts**

Social and economic impacts of permanently lowered lake levels include:

- Native communities would be hit particularly hard by any deterioration in the quality of the Great Lakes ecosystem. Their culture and livelihoods centre on the quality of the environment that they live in.
- Decreased lake levels would change beaches and shorelines, and would leave docks and shipping and boat accesses above the water line. This would decrease shorefront property values.<sup>5</sup>
- Recreational activities, such as boating, fishing, and hunting, may also be negatively affected, which would hurt the tourism industry.
- Water intakes for plants that treat water for domestic and industrial uses could be affected.<sup>6</sup>
- Hydroelectric power production is proportional to the amount of water available to be pumped through the system. Any decreases in water quantity would adversely affect the amount of energy available. Steam-electric plants may also be affected by dramatic drops in the level of Great Lakes water.<sup>7</sup>
- Commercial navigation would be negatively affected by decreases in water levels. The lower the water level, the less commercial freight carriers can transport because they need to reduce their weight to float higher in the water. Lower water levels would lead to increased demands for costly and environmentally hazardous dredging and an increased demand for disposal sites for contaminated dredgeate.
- The negative effects of reduced water levels would create greater demands to construct costly water control structures such as dams to try to lessen water level reductions in certain areas.<sup>8</sup> Acrimonious debates over water level controls would increase.
- Conflicts between governments over water controls and exports would increase. Relations between Canada and the United States could be negatively affected.<sup>9</sup>
- In 1981, the U.S. Army Corps of Engineers

estimated that the annual cost of negative impacts on power generation and commercial navigation of a 24,000 mld (6,500 mgd) diversion would be \$US45 million.<sup>10</sup>

### **EXISTING DIVERSIONS INTO THE GREAT LAKES BASIN**

#### **The Portage Canal Diversion**

Built in the 1860s, the Portage Canal connects the Wisconsin River to the Fox River, which flows into Lake Michigan. As a result, the canal diverts water from the Mississippi River basin into the Great Lakes Basin. At times of high water levels, as much as 240 mld (64.6 mgd) of water is diverted through the canal.<sup>11</sup> This canal is now used only for recreational purposes.

#### **The Long Lac and Ogoki Diversions**

The Long Lac and Ogoki diversions, completed in 1941 and 1943 respectively, divert water into Lake Superior that would normally flow into James Bay and from there into Hudson Bay.<sup>12</sup>

The Ogoki diversion moves water through Lake Nipigon and the Nipigon River into Lake Superior at a point 96 kilometres (60 miles) east of Thunder Bay. This water was diverted to support three hydroelectric plants on the Nipigon River.

The Long Lac diversion diverts water through Long Lake and the Aguasabon River into Lake Superior near Terrace Bay. The diversion provides water for the hydroelectric plant near Terrace Bay and to drive pulpwood down the river.

The combined average daily flow of these diversions is 13,468 mld (3,620 mgd). These diversions into the Great Lakes Basin are almost 75 percent larger than all current diversions out of the Great Lakes.

The International Joint Commission reported in 1985 that, although there were no significant basinwide environmental effects from these diversions, there have been important local environmental effects, particularly on fish spawning areas and habitat.<sup>13</sup> Because of the IJC's focus on U.S.-Canadian waters, it did not address the impacts of these diversions on the Cree people who live around James Bay, the watershed from which these waters are diverted into the Great Lakes.

## EXISTING DIVERSIONS OUT OF THE GREAT LAKES BASIN

### **The Forestport Feeder Diversion**

The New York State Barge Canal, which has been in operation since the early 1800s, diverts a small amount of water to the Hudson River watershed. Between 72 and 433 mld (19.5 and 117 mgd) of the waters discharged from the canal into the Hudson River watershed originate in the Great Lakes watershed.<sup>14</sup>

The original function of this canal was for shipment of goods. Today it is mainly used for recreational purposes.

### **The Chicago Diversion**

In 1848, the Illinois-Michigan Canal was opened to shipping traffic. This resulted in the diversion of 240 mld (64.6 mgd) of water from Lake Michigan at Chicago through the Chicago and Illinois Rivers to the Mississippi River.<sup>15</sup>

At that time Chicago's sewage flushed into the slowly moving, almost stagnant Chicago River and thence into Lake Michigan—the source of Chicago's drinking water. In 1885, 90,000 people died in Chicago from cholera as a result of this situation; this was over one-tenth of the city's population.

Because of this disaster, the Drainage and Water Supply Commission and the Sanitary District of Chicago were formed. The commission built a new channel and control structures to reverse the flow of the Chicago and Calumet Rivers so that sewage from Chicago would flow through the Illinois River to the Mississippi. The canal was completed in 1900.

During the 1920s, the Chicago diversion was as high as 24,000 mld (6,463 mgd).<sup>16</sup> In 1967, the U.S. Supreme Court limited the diversion to 7,600 mld (2,068 mgd), the level it is supposed to be at today.

The Chicago diversion has three components. The first component, 62 percent of the diversion, provides the water supply for the 5.7 million residents of northeast Illinois.<sup>17</sup> The second component is a direct

diversion from Lake Michigan into the Illinois River and Canal system for safe navigation and to increase flow in order to improve water quality in the Chicago area. The third component, 20 percent of the allowed diversion, is stormwater runoff that would have flowed into the Chicago River and from there into Lake Michigan, but which now flows the opposite direction into the Mississippi watershed.

It is expected that by the year 2000 Chicago's population will have increased by one million people. This is sure to create new pressures to increase the size of the Chicago diversion.<sup>18</sup>

The level of flows at this diversion has always been a controversial topic because it is the largest diversion out of the Great Lakes Basin and always threatens to increase. The current allocation of 7,600 mld (2,068 mgd) averaged over a forty-year period was established by a U.S. Supreme Court decree issued in 1967 and amended in 1980.<sup>19</sup>

In 1995, a dispute arose between Michigan and Illinois because approximately 740 mld (200 mgd) more water was being diverted from Lake Michigan through the Chicago diversion than allowed by the court decree. Illinois argued that a "paper

change rather than a physical change" in the diversion had occurred.<sup>20</sup> The state said new, more accurate velocity flow meters were being used to measure the diversion and that canal locks maintained by the U.S. Army Corps of Engineers were leaking. Michigan argued that Illinois "can't pretend that one number is another."<sup>21</sup>

The federal government and the eight Great Lakes states took this dispute to mediation. Illinois and Michigan requested that the Army Corps of Engineers be granted authority under the Water Resources Development Act to proceed with necessary repairs to eliminate leakage through the locks.<sup>22</sup>

In October 1996, the concerned parties came to an agreement in which Illinois agreed to reduce the outtake of water from Lake Michigan to the amount set in the 1967 and 1980 court decree. In return the

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## Water in Chicago

### River Now

### Resembles Liquid.

### The impossible has

### now happened!

### The Chicago River is

### becoming clear!

*New York Times*

January 14, 1900

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Map:

“Existing Great Lakes Inter-basin Diversions”

## **Existing Inter-Basin Diversions of Great Lakes Waters**

### **OUT OF THE GREAT LAKES BASIN**

1. Chicago, Illinois, diversion including Indiana’s Calumet River system, since 1800s, 7,600 million litres per day (2,068 million gallons per day).
2. Pleasant Prairie, Wisconsin, diversion, since 1990, up to 12 mld (3.2 mgd).
3. Forestport Feeder diversion to New York Barge Canal, since 1800s, 72–433 mld (19–117 mgd). Diverts Lake Ontario headwaters stream in the Adirondack Mountains into the Hudson River basin part of the canal.

### **INTO THE GREAT LAKES BASIN**

4. Ogoki diversion, Ontario, and
5. Long Lac diversion, Ontario, both since 1940s.  
These two diversions total 13,468 mld (3,620 mgd).
6. Portage Canal, Wisconsin, diversion, since 1800s, 240 mld (65 mgd). Diverts the Mississippi Basin’s Wisconsin River into the Great Lakes Basin’s Fox River.

eight Great Lakes states agreed not to take legal action over the withdrawal violations that had already occurred.<sup>23</sup>

### **The Pleasant Prairie Diversion**

The village of Pleasant Prairie, Wisconsin, straddles the Great Lakes and Mississippi Basins. Before 1990, Pleasant Prairie relied on groundwater for its water supply. In 1982, when two of the village's wells were found to be contaminated with radium at levels four times higher than federal standards, the state notified the village that it would have to correct the radium problem.<sup>24</sup>

Although there were a number of options available to the village, including a cleanup of the radium contamination, the village decided to bring Lake Michigan water to one of the wells through a diversion that would discharge into the Mississippi River basin. According to the village's officials, "this was by far the least expensive, the fastest, and the most practical [option]."<sup>25</sup>

In December 1989, the state gave approval for the diversion of 12 mld (3.2 mgd) of water to a well in Pleasant Prairie serving four thousand users in three subdivisions, a mobile home park and a factory.

Because of concerns raised by the province of Ontario, several of the Great Lakes states and citizens' groups led by Great Lakes United, the state of Wisconsin termed the diversion a "temporary" one. The agreement between the village and the state requires Pleasant Prairie to build a pipeline to return effluent from that section of the village to Lake Michigan by 2010.\*

Since the diversion began in 1990, development in the area served by the well has increased substantially. Village planners have approved several new developments, including 500- and 156-lot subdivisions.

### **PROPOSED DIVERSIONS**

Over the years numerous proposals for major diversions have been promoted.<sup>26</sup> Some of the more grandiose of these that have not come to fruition include:

- A plan by North American Water and Power Alliance and the Mexico–United States Hydroelectric Commission to drain Great Lakes water into the Mississippi River and ultimately to Mexico (1964–68).

- A plan to build a slurry pipe using water to transport coal from Lake Superior to Wyoming (1981).
- A project to pipe Great Lakes water to the High Plains states and the Southwest (1984).
- A project to blast a four-hundred-mile-long paved canal from Lake Superior to the Missouri River in South Dakota (1983).
- Legislation to blast a canal from Lake Erie to the Ohio River (1986–91).
- A federally funded plan to punch a hole in the bottom of Lake Michigan to drain water through bedrock layers for use in southern Illinois (1987).

### **Great Recycling and Northern Development (Grand) Canal Project**

This \$100 billion project has been called the "darling of the engineering industry." First proposed in 1959, this enterprise continues to be on the drawing board and periodically rises to a higher profile.

The Grand Canal project involves building a dyke across James Bay, turning the southern part of this salt water body into a fresh water lake. This water would then be diverted to the Great Lakes, where it would be sent on to the U.S. Midwest or to Lake Diefenbacher in Saskatchewan and then on to the U.S. South, Southwest, and perhaps Mexico.<sup>27</sup>

According to Tom Kierans, the developer of this project and its chief promoter, the prime benefits of this diversion would be that Great Lakes water levels would be stabilized and water-short areas of the Canadian and U.S. Midwest would have a secure water supply.<sup>28</sup>

Those who oppose this project fear disastrous effects from the reversal of water flows on the James Bay ecosystem and on the First Nations peoples who reside in the area.<sup>29</sup> The First Nations peoples believe that the project would "destroy the James Bay fisheries, threaten migratory bird populations and jeopardize general water quality."<sup>30</sup>

Although such a large scheme may seem unlikely to occur, it should not be dismissed as a pipedream. Although GRANDCo, the company formed to coordinate this project, is in a "state of suspension," Kierans is still actively promoting the idea.<sup>31</sup>

Some observers believe that large-scale engineering projects such as the Grand Canal were foreseen in the U.S.–Canada–Mexico free trade discussions; before his appointment as Canada's negotiator for the Canada–United States Free Trade Agreement, Simon Reisman was a director of GRANDCo Ltd.<sup>32</sup> It has been

\* Strangely, there are two versions of the compliance agreement between the state and Pleasant Prairie. One, which is signed, does not include the requirement to return the water by 2010. The unsigned agreement contains the requirement to return the water.

suggested, for example, that the Rafferty and Alameda dams in Alberta can only be understood as a part of a larger Grand Canal scheme.<sup>33</sup>

Rather than building the complete project at once, the more likely scenario would be the construction of small parts of the project one at a time.

### **New York City**

During a drought in the mid-1980s, New York City officials eyed Lakes Erie and Ontario as potential sources of fresh water. The floating of the idea immediately led to vehement reactions. The *Buffalo News* wrote an editorial entitled “Don’t Endanger Lakes To Aid Thirsty Big Apple” (September 14, 1985). The proposal was quickly dropped.

This was not the first time that such an idea was presented and dropped. In 1964, the “North American Waters—A Master Plan” proposed to pipe vast quantities of water from Lake Ontario to New York City.<sup>34</sup> Each summer that New York City experiences a drought ideas for diverting water from the Great Lakes resurface.

### **Lowell, Indiana**

Lowell, Indiana, is five miles outside of the Great Lakes watershed. The community’s groundwater had fluoride levels exceeding U.S. federal water quality standards; in 1987 the federal government issued Lowell an order to comply with federal standards by 1989.<sup>35</sup>

Lowell responded by seeking to divert Lake Michigan water through the Gary-Hobart Water Company at the rate of 4 mld (1.2 mgd).<sup>36</sup>

Québec, Ontario and Michigan formally objected to the diversion. Great Lakes United coordinated citizens’ groups opposed to the project. Finally, Michigan used its veto under the Federal Water Resources Development Act of 1986 to stop the project.

### **Mississippi River**

In the summer of 1988, a severe drought caused the Illinois and Mississippi Rivers to fall to record lows.<sup>37</sup> This caused navigational problems in the Mississippi and created serious problems for farmers trying to grow crops in the U.S. Midwest.<sup>38</sup> This led to calls by the state of Illinois and several U.S. senators for the U.S. Army Corps of Engineers to triple the flow of the Chicago diversion for one hundred days and possibly longer.<sup>39</sup> This proposal raised considerable public alarm in the Great Lakes Basin.

After studying the situation, the Army Corps of Engineers concluded that the increased diversion

would not make a “significant difference either in the navigability of the [river] channel or in the need for continued dredging of the river crossing as shoaling occur[ed].”<sup>40</sup> The proposal was dropped.

The precedent for increasing the Chicago diversion because of low water levels in the Mississippi was set in 1956.<sup>41</sup> A major drought from 1952 to 1956 resulted in low flows on the Mississippi River. As a result, in 1956, the U.S. Supreme Court granted a permit to increase the flow through the Chicago diversion for seventy-six days.

Changes in Mississippi River water levels are likely to create recurring calls in the future for either short- or long-term increases in diversions from the Great Lakes.

### **Kenosha, Wisconsin**

Between 1991 and 1992, the city of Kenosha built a water line from Lake Michigan to supply water to a newly annexed area slated for development. Instead of returning the water to the Great Lakes, Kenosha hooked up to Pleasant Prairie’s waste treatment system.<sup>42</sup> This meant that the water was diverted to the Mississippi watershed through the newly built Kenosha diversion.

Investigations by Great Lakes United and the Lake Michigan Federation revealed this illegal connection and diversion. The groups’ lobbying of Wisconsin’s governor resulted in Kenosha being forced to disconnect from Pleasant Prairie’s system and return their water to the Great Lakes Basin.<sup>43</sup>

### **Crandon Mine, Wisconsin**

Crandon Mining Company, owned by Exxon and Rio Algom, proposes to develop an underground hardrock metallic sulfide mine near Crandon, Wisconsin, in the Wolf River Basin, which is in the Great Lakes Basin. The company wants to mine 55 million tons of ore, extracting primarily copper and zinc and some lead, silver and gold.

The operation of this mine would result in the diversion of water from the Great Lakes Basin. To keep the mine from being flooded by groundwater from the surrounding aquifer, Crandon Mining Company would have to continuously pump water out of the mine twenty-four hours a day for more than thirty years.

The proposed mine would be located at the headwaters of the Wolf River. This pristine waterway is a state Outstanding Resource Water and a protected National Wild and Scenic River. Crandon Mining Company proposes to pump out the withdrawn

groundwater through a thirty-eight-mile-long pipeline to the Wisconsin River to avoid water treatment costs necessary to return the water to the Lake Michigan watershed.

Water loss at the headwaters additionally threatens area lakes, streams and wetland and is a diversion of Lake Michigan waters into the Mississippi River watershed. The water loss from the Great Lakes Basin from this proposal is estimated to be approximately 3.7 mld (1 mgd).<sup>44</sup>

As of February 1997, this proposal was still under consideration by the U.S. Army Corps of Engineers. The proposal is opposed by the Mole Lake Reservation, a large number of local organizations and local governments along both the Wolf and Wisconsin Rivers.

#### **Akron, Ohio**

In early 1996, Akron, Ohio, proposed to divert 13 to 19 mld (3.4 to 5 mgd) of water each day from the Great Lakes Basin. The water would go to unincorporated suburbs beyond the city's limits just over the border of the Great Lakes Basin. While admitting that this is officially a diversion from the Great Lakes Basin, Akron officials say that the diversion will not have negative effects on the Great Lakes because as much water will be returned to the Great Lakes as is withdrawn. This will be achieved through a combination of discharges from the city's sewage treatment plant and water diverted from the Ohio River watershed through the Ohio Canal.<sup>45</sup>

By promising "no net loss" of water from the Great Lakes Basin, Akron hopes to avoid the controversy usually associated with diversions of water from the Great Lakes. Nevertheless, environmental groups are opposed to the proposal for two main reasons. The "no net loss" concept does not address water quality issues. Water returned after use usually is degraded in quality. Also, the proposal is a precedent-setting end run that numerous other municipalities just beyond

the edge of the Great Lakes Basin would use to try to justify diversions from the Great Lakes.

The decision on the Akron diversion proposal will be made after it is reviewed by the other Great Lakes states and provinces under the U.S. Water Resources Development Act and the Great Lakes Charter.

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**If all these "minor" diversions were allowed, their cumulative impacts would equal that of one major diversion. In the meantime, the precedent to have uncontrolled out-of-basin use of Great Lakes water will have been set.**

#### ***Envied Waters***<sup>47</sup>

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#### **Potential for Requests for Diversions to Areas Adjacent to the Great Lakes Basin**

In 1993, Great Lakes United staff member Bruce Kershner and intern Carl Bolster studied the likelihood that communities just outside of the Great Lakes Basin would seek to divert Great Lakes water for public drinking water and navigational purposes.\*<sup>46</sup>

The study concluded that the areas with the highest potential to raise demands to divert water from the Great Lakes are Kenosha-Pleasant Prairie (Wisconsin), Lowell-Gary-Hobart (Indiana), Waukesha-New Berlin-Milwaukee (Wisconsin), Akron-Cleveland (Ohio), Chicago (Illinois) and New York City. Recent diversion requests are proving the accuracy of this study.

#### **DIVERSIONS OF WATER WITHIN THE GREAT LAKES BASIN**

In several places around the Great Lakes, water is diverted from one place to the other, bypassing waterways or lakes in between the withdrawal and discharge points. For example, the city of Detroit withdraws its drinking water from Lake Huron and discharges contaminated effluent from its sewage treatment plant into the Detroit River. This robs the St. Clair River and Lake St. Clair of part of their normal flow.

Similarly, the city of London obtains its water supply from a point on Lake Huron over 50 kilometres (30 miles) away and discharges its sewage treatment plant effluent down the Thames River to

\* This study did not include Michigan and Ontario because water withdrawals here would be unlikely to result in diversion of waters out of the Great Lakes Basin.

Lake St. Clair. It thus diverts water past the St. Clair River.

Such diversions within the Great Lakes Basin affect water flows in certain sections of the Great Lakes system and, as a result, harm wetlands and fish, bird and wildlife habitat.

For the past several years, the Ontario government and several municipalities in southern Ontario have been considering proposals by private companies to build a \$500-million pipeline to divert 190 to 229 mld (50 to 60 mgd) of water from Georgian Bay on Lake Huron to provide water to York, Peel, Halton, Wellington and Waterloo Regions.<sup>48</sup> This intrabasin transfer would bypass much of Lake Huron, all of the St. Clair and Detroit Rivers, and, depending on the municipality served, Lake Erie and the Niagara River.

According to a document prepared by TransCanada Pipelines, the company that originally proposed building the pipeline, "the principle objective for the proposed system is to replace existing groundwater supplies in communities where it is found to be chronically lacking from a quality, quantity or long term reliability perspective."<sup>49</sup>

Citizens' groups have major concerns about the ecological disruptions that would occur at both ends of the pipeline and along the major part of the Great Lakes that would be bypassed by such a diversion. They believe that it would be more cost effective to remediate contaminated groundwater and practice water conservation than to build the pipeline. They

also believe that the pipeline would encourage growth beyond the natural carrying capacity of the local watersheds and would lead to the destruction of wetlands, which are crucial to the recharge of groundwater supplies.<sup>50</sup>

York Region, just north of Toronto, has most actively pursued this proposal, after awarding a tender to provide future water supplies to a consortium of Consumers Gas and British Northwest. In 1996, they came out with a proposal to draw 655 mld (177 mgd) of water from Georgian Bay and discharge treated sewage into Lake Ontario. Several citizens groups, including the Georgian Bay Association, the Safe Sewage Committee, the Canadian Environmental Law Association and Great Lakes United, objected to the proposal on environmental grounds. In December 1996, York Regional Council dropped the proposal to divert water from Georgian Bay, primarily for economic reasons.

#### THE THIRST OF THE REST OF THE CONTINENT

Groundwater is being mined at a rapid rate in several major parts of North America. The Worldwatch Institute points out serious depletion of groundwater in the High Plains of the United States (the Ogallala Aquifer), California, the southwestern United States, Mexico City and the Valley of Mexico.<sup>51</sup>

The Commission for Environmental Cooperation,

Table:

"Groundwater Depletion in Major Regions of the World."

which was set up under NAFTA, observed that “in 1995, the lack of water in northern Mexico killed crops and cattle, while fish and other aquatic life died from rising salt levels in rivers.”<sup>52</sup> The CEC concluded that this situation is likely to worsen. These problems led Mexico to ask the United States for alternative water supplies; the United States refused the request.

As water sources throughout North America are depleted, the grand schemes that have thus far been set aside may well become more viable and the need ever more compelling. Generally the estimate of impacts on water levels across the Great Lakes from a 24,000 mld (6,500 mgd)\* diversion anywhere in the Great Lakes is a decrease of 0.15 metres (half a foot).<sup>54</sup> A 24,000 mld diversion would be small in comparison with the thirst that these major areas of the United States and Mexico may experience.

#### HISTORICAL LESSONS OF GREAT LAKES DIVERSIONS

The existing diversions in the Great Lakes and the numerous proposals that have not come to fruition provide us with some important lessons that we must learn from for the future.

##### **Each diversion is of basinwide concern.**

Because the Great Lakes system is a hydrologically integrated system, changes in levels in one part of the Basin affect other parts of the Basin. For example, the Chicago diversion not only lowers Lake Michigan levels (by 6 centimetres or 2.5 inches); it also lowers the waters of Lake Erie (by 4.5 centimetres or 1.75 inches) and Lake Ontario (by 3 centimetres or 1.25

inches).<sup>55</sup> In addition, even very small diversions have basinwide implications, making it more difficult to deny future applications for similar types of diversions in other parts of the Basin.

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**As water sources throughout the North American continent are depleted, the grand schemes that have thus far been set aside may well become more viable and the need ever more compelling**

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##### **Requests for transfers adjacent to the Great Lakes Basin will increase.**

Recent examples show that the demands from communities just beyond the border of the Great Lakes Basin will increase for two main reasons: (i) contamination of groundwater leads communities to look to the Great Lakes as a cheaper way of getting water than cleaning up and protecting their groundwater supplies; and (ii) the desire of communities to grow in terms of both residential subdivisions and industrial and commercial enterprises leads them to look to the Great Lakes as a new water source.

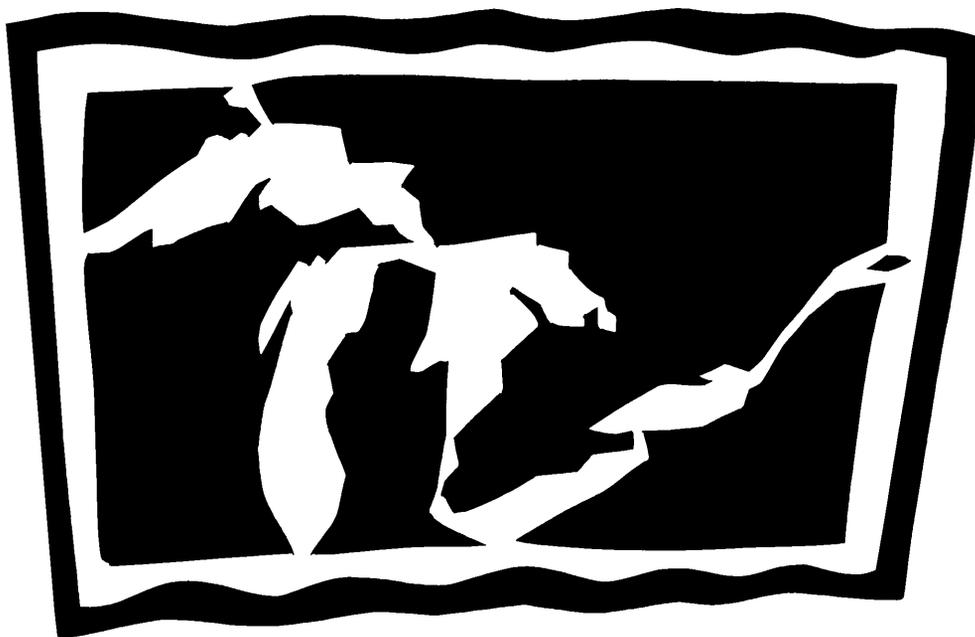
##### **Demands for Great Lakes water from distant communities will increase.**

As history has shown, when regions of any other part of the continent experience a drought or draw down their water reserves, their eyes turn enviously to the luxury of waters in the Great Lakes. This situation will not stop. Indeed, these calls will become ever more urgent.

The thirst of the people beyond the Basin's borders for water will never end and, as a result, diversions will never be a dead issue in the Great Lakes Basin. Therefore, we must have clear policies on how we will deal with diversions.

The adequacy of present efforts to control Great Lakes diversions will be discussed in the next two chapters.

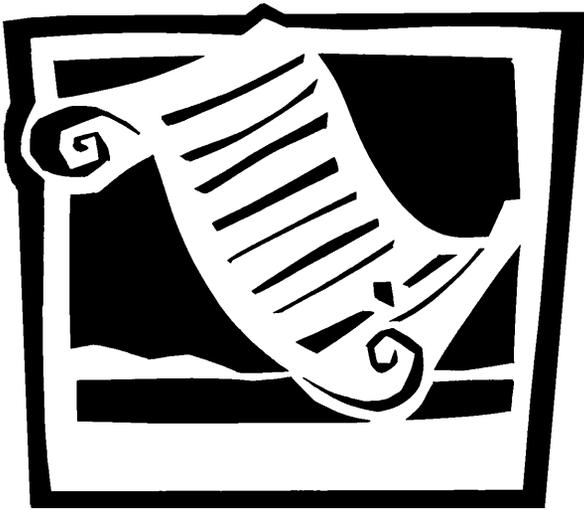
\* A flow this size would cover a football field with four inches of water every second.<sup>53</sup>



# **Who's in Charge?**

## **The Patchwork of Protections**





## The Great Lakes Charter

Periodically, the issue of diversions from the Great Lakes rises to a high public and political profile. The early 1980s was one such time. As shown in chapter 3, several schemes for major diversions arose in this period as thirsty regions looked enviously at the bountiful waters of the Great Lakes.

In 1983, the Council of Great Lakes Governors\* created a Task Force on Water Diversion and Great Lakes Institutions to examine the existing institutional mechanisms to protect the Great Lakes from diversions and to recommend ways to strengthen the ability of the Great Lakes states and provinces to collectively and individually protect their shared water resources. The task force drew up the Great Lakes Charter,<sup>1</sup> a nonbinding agreement, the purpose of which was to improve the management of water resources in the Basin, mainly through the regulation of large consumptive uses and diversions of Great Lakes water.

Considerable controversy surrounded the proposed charter. Environmental groups, led by the Michigan United Conservation Clubs, lobbied to strengthen the provisions of the charter before it was signed. The groups opposed the original drafts of the charter because they believed that, by setting out procedures to obtain approvals for withdrawals and diversions, the

charter would act as a licensing system rather than as a deterrent to misuse of Great Lakes waters. They feared that the charter would “send a clear message that you can divert our water under certain circumstances or for a certain price.”<sup>2</sup>

The controversy generated on this issue led the governor of Michigan to delay the signing of the charter because it would “sanction and legitimize” diversions from the Great Lakes.<sup>3</sup> Ontario’s premier, who supported moving rapidly forward with the charter, was accused by environmental groups of “pushing for a tentative deal that could drain water from the Great Lakes to slake the thirst of the parched U.S. southwest.”<sup>4</sup>

As a result of the controversy, sections on legislative standards, criteria for review of water withdrawals, diversions and consumptive uses, and criteria to limit interbasin diversions were removed from the charter before it was signed.<sup>5</sup> Nevertheless, environmental groups remained concerned that the charter “is founded on the presumption that some new or increased diversions of Great Lakes waters are inevitable and acceptable.”<sup>6</sup>

The eight Great Lakes states, Ontario and Québec signed the Great Lakes Charter on February 10, 1985.

\* The Council of Great Lakes Governors comprises all eight Great Lakes state governments. The provinces of Ontario and Québec are usually informally included in the council’s activities. The objective of the council is to address public policy issues common to all Great Lakes states.

## THE COMMITMENTS IN THE GREAT LAKES CHARTER

The stated purpose of the charter is

to conserve the levels and flows of the Great Lakes and their tributary and connecting waters; to protect and conserve the environmental balance of the Great Lakes Basin ecosystem; to provide for cooperative programs and management of the water resources of the Great Lakes Basin by the signatory States and Provinces; to make secure and protect present developments within the region; and to provide a secure foundation for future investment and development within the region.

The charter has four main provisions:

- The establishment of a common database
- The creation of a Water Resources Management Committee
- The development of a Prior Notice and Consultation Procedure
- The formation of a Basin Water Resources Management Program.

### Common Database

A complete, up-to-date database describing how Great Lakes water is used and how much is consumed and diverted is a necessary basis for informed, sound public policy-making. Under the charter, each jurisdiction is to

pursue the development and maintenance of a common base of data and information regarding the use and management of Basin water resources and the establishment of systematic arrangements for the exchange of water data and information.

Each state and province was to enact legislation to collect information on new or increased withdrawals of Great Lakes Basin water greater than 380,000 litres per day (lpd) or 100,000 gallons per day (gpd) averaged over a thirty-day period.

The Water Resources Management Committee, whose members were appointed by the Great Lakes governors and premiers, was charged with the responsibility for developing this database. The responsibility for maintaining this database has fallen to the Great Lakes Commission, an interstate compact

comprised of representatives from all states; Canada has no formal participation in this compact, though there are a number of Canadian observers. The commission prepares the *Annual Report of the Great Lakes Regional Water Use Data Base Repository* on the basis of information submitted to it by the Great Lakes states and provinces.

This database has several major weaknesses:

First, the database is out of date. At the beginning of 1997, the most recent *Annual Report* available was that representing 1992 water use.

Second, although there are broad guidelines established for water use data collection, within these parameters there is a great deal of flexibility. For example, the water withdrawal data submitted by Illinois for the 1992 *Annual Report* were 100 percent measured. By contrast, all of Wisconsin's data were estimated.<sup>7</sup> This means there can be substantial variations among jurisdictions in the accuracy of information provided. Because the data submitted by each jurisdiction have such different collection bases it is difficult to do good trend analyses; comparisons among jurisdictions become dangerous. But such analyses are crucial to effective basinwide management of Great Lakes water resources.<sup>8</sup>

Third, not every jurisdiction has complete water data collection and reporting programmes. Michigan did not pass legislation requiring mandatory water use reporting until 1990. In 1995, Michigan was in the second year of a three-year implementation schedule for this legislation, which would require annual registration of water uses over 370,000 lpd (100,000 gpd) averaged over a thirty-day period.<sup>9</sup> As a result, the most recent *Annual Report* does not include complete data for Michigan.

Fourth, increasingly, as jurisdictions around the Basin translate deficit-cutting measures into smaller budgets for water management programmes, less resources will be devoted to ensuring the accuracy of the water use data. For example, in Wisconsin, in order to save money, the water use data for high-capacity irrigation wells will in the future be based on the past five years of data collection rather than on newly gathered data.

The combination of all these problems means that policy decisions based on the data provided by the *Annual Report* are not fully informed. For example, in 1993 Michigan approved a consumptive use of Lake Huron water to irrigate the land of 13 farmers (the Mud Creek Irrigation plan) despite the fact that it did not have accurate information on the amount of water it was already consuming.

It is impossible to measure the cumulative impacts of individual projects on the environment when there are large gaps in the available data.

### **Prior Notice and Consultation Procedure**

The Prior Notice and Consultation (PNC) procedure applies to any new or increased diversion out of the Great Lakes Basin or consumptive use of water resources that exceeds 19 mld (5 mgd) averaged over a thirty-day period.

Under this process, the state or province considering the issuance of an approval or permit for such a project notifies the other states, provinces and, “where appropriate,” the International Joint Commission.\* If one of the Great Lakes states or provinces files an objection to the proposal, the permitting jurisdiction is required to consult with the other Great Lakes states and provinces “to seek and provide mutually agreeable recommendations to the permitting State or Province.” The charter procedure does not legally limit the right of a jurisdiction to give a permit if it so desires; any vote taken under the consultation procedure is nonbinding.

The PNC procedure is crucial to the functioning of the charter, since it is the mechanism that encourages each state and province to take into account broader, Great Lakes-wide concerns when considering whether to allow a major consumptive use or diversion. Unfortunately, several significant limitations in the effectiveness of this procedure have become evident.

#### *High trigger point*

Since the signing of the charter, only one consumptive use or diversion proposal, the 1993 Mud Creek Irrigation District proposal, was above the trigger point at which consultations are supposed to be carried out.

The Pleasant Prairie, Lowell and Akron diversion proposals were below the trigger. Nevertheless, some attempt was made to follow the PNC procedures in the charter in these cases.

#### *Lack of clarity in the relationship between Water Resources Development Act and the charter*

One year after the signing of the Great Lakes Charter, the U.S. Congress passed the Water Resources Development Act of 1986 (WRDA). This legislation prohibits

any diversion of Great Lakes water by any State, Federal agency, or private entity for use outside the Great Lakes basin unless such diversion is

approved by the Governor of each of the Great Lakes States.

This means that any Great Lakes governor can veto a diversion proposal of any size that would take water out of the Great Lakes Basin. This legislation does not provide for an oversight agency or a consultation procedure. The responsibility for overseeing the implementation of this legislation has fallen to the Council of Great Lakes Governors, the same institution that oversees the implementation of the charter. This has resulted in a complicated, largely undefined and confusing consultation procedure.

Since the Pleasant Prairie and Lowell proposals were for diversions out of the Basin, the WRDA came into play. In a questionable move under the WRDA, Wisconsin took the lack of objection by Michigan to the Pleasant Prairie proposal and the lack of response by some states to indicate that these states had approved of the project. This is highly problematic since the legislation requires the active approval of each governor. Despite the lack of such an approval, the diversion project went ahead.

The procedure followed for the Lowell diversion was different from that for Pleasant Prairie. In a complicated procedure, the Lowell diversion was put to two votes: one legally binding under the WRDA, which included only the states, and one non-legally binding under the charter, which included both the states and the provinces.<sup>10</sup> This diversion was vetoed by Michigan under the WRDA; Michigan, Ontario and Québec objected under the charter.

During the PNC process for the Lowell diversion, Indiana suggested that before any future diversion proposal was put forward, a specific process for the approval of diversions should be established.<sup>11</sup> To date, no progress has been made on this.

#### *Application to Chicago diversion*

It is unclear whether the Great Lakes Charter and WRDA apply to the Chicago diversion out of Lake Michigan. If the Chicago diversion were proposed today, both the charter and the WRDA would apply. But the fact that this diversion has existed for over ninety years makes its status uncertain. During the drought of 1988, there was talk of tripling the size of the Chicago diversion. The U.S. Army Corps of Engineers claimed that it had the authority to proceed with the project without the approval of the Great Lakes states or provinces.<sup>12</sup> Illinois officials claimed that U.S. federal and international enactments did not include existing diversions.<sup>13</sup>

\* The role of the IJC is discussed in chapter 6.

Further, because Lake Michigan is solely within the boundaries of the United States, arguments have been made that it is not subject to international obligations; thus there is some question as to what input Canada could have with respect to decisions about this diversion.

If the largest diversion in the Great Lakes Basin does not fall under the charter, major decisions affecting the watershed could be made without consultation with all the Great Lakes states and provinces.

#### *Nonbinding nature of charter*

Since the charter is not binding, there are serious questions as to its usefulness. In 1993, when Michigan proposed the Mud Creek Irrigation District project, Ontario and Indiana strongly opposed the project, and others discouraged it; nevertheless, the project was approved by the state of Michigan.

For a consultation process to be effective, the jurisdictions being consulted must be able to legally influence the decision made by the state or province proposing the diversion or consumptive use.

#### **Water Resources Management Committee**

Under the charter, a Water Resources Management Committee (WRMC), comprising those with expertise in water management, was appointed by the governors and premiers. The WRMC's role is to develop the database and the PNC procedures.

As has already been shown, these tasks have not been adequately fulfilled. As of early 1997, the WRMC had not met for over three years. It has been suggested that this is due to a lack of financial support for the committee from Great Lakes jurisdictions.<sup>14</sup>

#### **Basin Water Resources Management Program**

When they signed the charter in 1985, the governors and premiers committed themselves to "the development of a cooperative water resources management program for the Great Lakes Basin." This program was to inventory surface and groundwater resources, identify and assess existing and future demands for diversions, withdrawals and consumptive uses, including a consideration of ecological needs, develop cooperative policies "to minimize the consumptive use of the Basin's water resources" and recommend "policies to guide the coordinated conservation, development, protection, use and management of the water resources of the Great

Lakes Basin." Almost no progress has been made on this critical commitment.

When Indiana proposed a diversion of Lake Michigan water to the town of Lowell, it also proposed that the WRMC develop a "basin-wide conservation and use plan by July 1, 1997."<sup>15</sup> Although there were some preliminary discussions on such a policy, nothing has been done towards the development of a coordinated Basin water conservation policy.

#### **MUD CREEK IRRIGATION DISTRICT, MICHIGAN**

In 1993, the Mud Creek Irrigation Board of Michigan proposed to pump 23 to 32 mld (6.1 to 8.6 mgd) of water from Saginaw Bay in Lake Huron to irrigate adjacent farmland for between sixty and seventy days a year.<sup>16</sup> The proposed irrigation project would benefit thirteen farmers who anticipated improvements to their crops; some of them were considering changing their production to higher-value fresh fruit and vegetable crops.<sup>17</sup>

This sizable consumptive use triggered the consultation procedures under the Great Lakes Charter. Several Great Lakes states, the province of Ontario and Great Lakes United objected to the proposal because this consumptive use would result in the loss of significant volumes of water from the Great Lakes. They also felt that the proposal would set an unfortunate precedent, that the increases to agricultural productivity would be marginal, and that the project was similar in character to federally subsidized Western water projects that have proven unsustainable. Michigan's promotion of the proposal was also questioned because Michigan had objected to a much smaller diversion in Indiana.<sup>18</sup>

Despite this opposition, Michigan approved the project. The implementation of the Mud Creek project was delayed until the possible impacts of the migration of zebra mussels through the water intake were resolved. In late 1996, the project received the go-ahead when the Mud Creek Irrigation District agreed to put micron screens on the water intakes to filter out zebra mussel larvae.

This is the first such water taking in the Great Lakes. Michigan proudly sees it as a precedent for other such projects.<sup>19</sup> Ten similar irrigation projects are under consideration in the same area of Michigan.

## THE FUTURE OF THE CHARTER

The concerns of environmentalists that the charter would be used as a licensing scheme have not been realized. Probably, this is more the result of a lack of funding and urgency for costly new proposals than the existence and use of the charter. This does not mean that the situation could not change in the future. Therefore, a strong charter is still needed.

Three basic reforms are needed to make the charter become a more satisfactory instrument to help address Great Lakes water quantity issues:

### **Make the charter binding.**

The charter relies upon the good faith and changing priorities of politicians. None of the current governors or premiers in the Great Lakes Basin has been in office long enough to experience a drought or any major diversion proposals. As a result, water quantity issues are not on their agendas. The charter cannot be relied upon unless it becomes binding.

### **Include more parties in the charter.**

A number of important sectors in Great Lakes water management are not parties to the charter. The First Nations and Tribes, the federal governments, and the International Joint Commission, each of whom has a significant role to play, were not asked to be signatories to the charter. An approach that truly saw the Basin as one hydrologic system would involve as many actors as possible in a substantive way in the decision-making process.

### **Immediately develop a basinwide water resources management plan.**

Governments in the Great Lakes still act primarily in their own narrow, short-term self-interest. Even

though the states and provinces in the Great Lakes Basin pledged through the Great Lakes Charter to take a basinwide approach to diversion and consumptive uses issues, they continue to act primarily on the basis of their desire to get water for themselves.

States such as Wisconsin and Indiana continue to support proposals for diversions within their jurisdictions—proposals that are only dropped after they are vetoed by another state. Michigan, which has been the state to most consistently veto diversion proposals by other states, ignored the concerns raised by Ontario and several states when it wanted to introduce a major new consumptive use for irrigation at Mud Creek.

It is essential that the commitment of the premiers and governors to develop a basinwide water resources management plan be acted on immediately. In developing this plan, the premiers

and governors should ensure that all those with an interest in these issues are fully included in the planning and decision-making process.

The guiding principle for the development of this plan should be that which was stated in the charter:

the development of cooperative policies and practices to minimize the consumptive use of the Basin's water resources.

This goal is essential. Unless we set an example for areas outside of the Great Lakes Basin in wise water management, we cannot ethically or persuasively argue that others should learn to live with less water.

By not proceeding with aggressive programs to sustain the lakes, we will drive future generations into a situation where diversions of Great Lakes waters are inevitable.

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**Great Lakes  
governments  
still act primarily  
in their own  
narrow, short-term  
self-interest**

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## Federal, Provincial and State Water Quantity Management

One of the main reasons for developing the Great Lakes Charter was to bring more consistency to the diversity of water use and diversion control systems in the Great Lakes Basin. Two federal governments and ten state and provincial governments are responsible for the water quantity regimes in the Great Lakes Basin.

### THE CONSTITUTIONAL FRAMEWORKS

#### The United States

##### *Federal powers*

The U.S. Constitution provides Congress with powers over matters of national as opposed to purely local interest. Given the importance of water resources, interstate waters have long been recognized as within this realm of national interest.<sup>1</sup> The most important basis of authority upon which Congress can regulate interstate waters is the commerce clause of the Constitution.\*

The objective of this clause is to support a national common market and stop protectionism between states. A U.S. Supreme Court decision in 1963 found that the commerce clause gives Congress the authority to allocate interstate waters among states in order to serve the national interest—even if this

means overriding state law.<sup>2</sup>

##### *State powers*

State power to regulate water resources is based in both general police power and the power to determine the ownership of beds of navigable waters. This power is subject to four limitations: that interstate waters must be equitably apportioned when shared among riparian states, that property cannot be taken without due process of law, that the public trust doctrine applies to navigable waters, and that state powers are subordinate to federal authority.

The U.S. Supreme Court's interpretation of the commerce clause has significantly limited the types of regulations that states can make restricting interstate transfers of water. In the 1982 decision of *Sporhase v. Nebraska*, the Supreme Court held that groundwater is a commodity of interstate commerce and that, therefore, states cannot place unreasonable restraints on its passage across borders. According to the Court's analysis, if a state law preferring in-state water users is obviously discriminatory, it must pass two tests: it must be shown that the state's interest outweighs the federal interest in a free common market, and that the means chosen to prefer in-state users are as minimally intrusive as possible.

The Court also enunciated four factors that can justify limited discrimination against nonresidents:

\* This clause gives Congress the power to "regulate commerce with foreign nations and among the several states, and with the Indian Tribes."

- Protecting the health and safety of state residents (though not the state economy) is important.
- State boundaries are important in establishing state water rights.
- State ownership of the water resource may justify some preferential treatment for state residents.
- Conservation measures used to provide water for residents in times of shortage may justify restrictions on out-of-state residents.<sup>3</sup>

Later cases have expanded on *Sporhase* and held that, if a state interest is high in preventing a certain use of water, the law will not be unconstitutional to the extent that the regulation applies evenhandedly to in-state and out-of-state users.<sup>4</sup>

This examination of the commerce power and interstate water transfers shows that it is not an easy matter for states to prefer their own residents. Were the Great Lakes states to attempt to regulate water transfers, they would have to be able to demonstrate that their interests supersede the national interest in a common market, and that they are properly and efficiently utilizing their own resources.<sup>5</sup> One author has suggested that to be constitutional a state water management plan would have to:

- Develop an in-depth water allocation plan for a reasonable period of time, such as twenty to thirty years.
- Tie applications for all new water uses to the list of priorities established in the allocation plan.
- Deny water use allocations not consistent with the plan.<sup>6</sup>

If laws preventing or controlling water transfers out of the Great Lakes Basin are to survive constitutional challenge, Great Lakes states must have well-defined water use and conservation strategies in place. It is doubtful whether any of the Great Lakes states currently have programs that would meet all of the above criteria.

### **Canada**

Water is subject to regulation by both the federal and the provincial governments. This complicates attempts to determine who controls or should control different aspects of Great Lakes water regulation.

#### *Provincial powers*

Regulation of domestic water consumption and industrial use is for the most part under the control of the provinces.<sup>7</sup> There are two main constitutional

bases for this power. First, the Canadian Constitution gives the provinces ownership of all lands, mines, minerals and royalties that belonged to them when they joined the confederation. Ownership of lands includes the water that flows over or under the land.

A further proprietary interest over water is given to the provinces through their ownership of all other public property, excluding that required by the federal government for defence. The implication of this grant of power is that the provinces have ownership of all watercourses as well as of the soil and beds of navigable waters. This gives the provinces powers over publicly owned water resources, since they can deal with them as a private owner.

These proprietary rights are supplemented by constitutional provisions that allow the provinces to legislate in other areas, such as the management and sale of public lands, property and civil rights, local works and undertakings, and generally all matters of a merely local or private nature in the province. In effect, the provinces are able to legislate with regard to all lands under or adjacent to waters in the provinces and land flooded by diversions. Further, since 1982 the provinces have had the power to develop, conserve and manage sites and facilities for hydroelectric power generation. Clearly, each province has the legislative competence to regulate water use within the province.<sup>8</sup>

Provincial powers on their own are not adequate to build a basinwide strategy for sustainable water management in the Great Lakes because the Great Lakes are international waters; this means that the federal government must also be involved.

#### *Federal powers*

The Canadian federal government has a proprietary interest in a number of relevant areas, including canals that connect lands, water power, public harbours, rivers and lake improvements, and lands set apart for general public purposes. The federal government also has a proprietary interest in Native Reserves and national parks.

The federal government also has significant powers over fisheries, navigation and shipping, when these matters are interprovincial or international in nature.

The federal Fisheries Act could provide the basis for Great Lakes waters protection. Sections 35 and 36 of the act provide for protection of waters frequented by fish and for protection of fish habitat. Charges under the Fisheries Act have been brought against companies that destroy fish spawning grounds by lowering water levels.<sup>9</sup> Some of the largest fines ever

levied by the Canadian government against polluters have arisen from charges under the Fisheries Act.

The Navigable Waters Protection Act and the International River Improvements Act arise from the government's powers to regulate navigation and shipping. These acts could establish the basis for federal involvement in a basinwide management strategy focused on water quantity issues.

The Canadian Constitution provides the federal government with a "residual" power; the power to rule regarding the "peace, order and good government" of Canada. This power has been restricted and carefully delineated by the Supreme Court of Canada.

In the Court's ruling in *R. v. Crown Zellerbach*, which established federal jurisdiction to regulate toxic chemicals, the Court gave the federal government jurisdiction under the "national concern" doctrine:

the most important element of national dimension or national concern is a need for one national law which cannot realistically be satisfied by cooperative provincial action because the failure of one province to cooperate would carry with it grave consequences for the residents of other provinces.

This determination has made many individuals and organizations argue that the Canadian federal government has jurisdiction and should act on environmental matters that have a national dimension or are of national concern—for example, protecting the waters of the Great Lakes. To date, however, largely out of deference to provincial hostility to their powers being intruded upon, the federal government has acted very cautiously in this area.

Only the federal government has the constitutional capacity to enter into international agreements. As the Great Lakes are international waters, a basinwide management plan could be based on an existing treaty (such as the Boundary Waters Treaty) or a new treaty. This would require federal involvement.

It is clear that under the Canadian Constitution, actions by both the federal and provincial governments are necessary to establish a framework to preserve the water resources of the Great Lakes.

## FEDERAL INITIATIVES

### The United States

The U.S. Congress has not been a strong presence in terms of Great Lakes water quantity management. The

one major exception is the Water Resources Development Act of 1986 (WRDA), which requires approval by the governor of each of the Great Lakes states for diversions out of the Great Lakes Basin.

This legislation is more powerful than the Great Lakes Charter because it requires unanimous consent by the governors and because it has no minimum trigger level, which means that the legislation applies to even the smallest diversion out of the Basin. This legislation is so far-reaching that it prevents federal agencies from even studying the possibility of transferring water outside of the Basin without the consent of all governors. Unlike the Great Lakes Charter, the WRDA does not apply to major consumptive uses within the Basin.

This legislation does, however, have several weaknesses:

- It applies only to diversions that were established after 1986; for example, there is debate as to whether the legislation applies to increases to the Chicago diversion.
- It applies only to interbasin diversions; uses within the Great Lakes Basin do not fall under this legislation.
- There is ambiguity as to whether the terms of the legislation provide that each governor has to actually consent to a diversion proposal, or whether it simply means that they have the right to veto a proposal for a diversion; this question arose around the issuance of the permit for the Pleasant Prairie diversion.
- This legislation applies only to the United States; Ontario and Québec are excluded from the provisions of the law despite the fact that water resources in both these jurisdictions would be detrimentally affected by a diversion out of the Great Lakes.
- Confusion has arisen around whether the WRDA applies to diversions of groundwater. The state of Wisconsin claims that the provisions of the WRDA do not apply to the diversion of groundwater out of the Great Lakes Basin that would occur through the proposed Crandon Mine operation because "groundwater diversions have never been considered to be subject to the Act."<sup>10</sup>

In terms of impact on water resources in the Great Lakes, one of the most important aspects of the federal role is the mandate and actions of the U.S. Army Corps of Engineers. Through the Rivers and Harbors Appropriation Act, which gives the corps

jurisdiction over the use of navigable waters, and under the Clean Water Act, which gives it expansive powers to review dredge and fill proposals, the corps has significant influence over the management of water quality and quantity in the Great Lakes.<sup>11</sup>

An important example of the considerable powers of the corps was its contention during the drought of 1988 that it had the jurisdiction to unilaterally triple the size of the Chicago diversion in order to improve navigation in the Mississippi River.

### Canada

The most comprehensive statement of federal government policy with respect to water quantity management in Canada is the Federal Water Policy<sup>12</sup> released in 1987. This policy has the overall objective of encouraging wise and efficient uses of Canadian water resources in order to sustain them for the use of present and future generations.

Two of the commitments of the federal government in this and subsequent policies are particularly relevant to Great Lakes water quantity issues:

- Opposition to interbasin diversions. Environment Canada states that it is opposed to large-scale exports of Canada's water through pipelines, although it does not oppose smaller-scale exports, such as those through bottled water.<sup>13</sup> The government has failed to pass legislation to implement this commitment.
- Encouragement of water conservation, particularly in terms of real cost pricing\* and efficient uses of water. While the federal government has endorsed the concept of real cost water pricing and has done research in this area, little other substantive progress has been made.

With the recent 30 percent budget cuts at Environment Canada and the increased federal government focus on harmonization with provincial programs, it seems likely that the federal government's role in these issues will become ever smaller.<sup>14</sup>

After a national workshop and eight regional workshops in 1995, researchers for the Royal Society of Canada concluded that water had become

almost invisible in the federal government. People are unsure who is now responsible and providing leadership (in the federal government) for water issues. They also are worried that the outcome of

this reorientation, along with downsizing in Environment Canada, will lead to insufficient capacity in the federal system to understand and to deal with pressing water issues.<sup>15</sup>

## STATE AND PROVINCIAL INITIATIVES

### Common Law

The basis for state and provincial water management is found in the common law under the doctrine of riparian rights, except in Québec. These rights assert that a person has the right to use water if they own the land to which water is contiguous.

The starting point for the riparian rights doctrine was the "natural flow rule" whereby each riparian had a right to an unimpaired flow of waters both in terms of quality and quantity. The rule was useful for protecting water resources, but agricultural and industrial development interests found it placed too many constraints on water use. In response to this, the common law developed the "reasonable use rule," which understood that efficient usage required that each consecutive user would have to be subject to some decrease in the quantity of water available.

A pure riparian system or even one which incorporates a notion of reasonableness is not an adequate basis on which to build a basinwide water management regime because the doctrine is characterized by uncertainty and makes the quantification of water uses extremely problematic. Further, it is difficult under this doctrine for one "reasonable use" to be protected from another. When all uses have equal claims to be recognized, such as during emergency or drought, there is little or no basis upon which to limit some uses over others.<sup>16</sup> The cumulative impacts of "reasonable uses" can result in an excessive decrease in stream flows and the amount of water available for human uses, habitats, water quality, and the integrity of the entire ecosystem.

Because of the failings of the riparian doctrine, many states have supplemented it with a ranking of uses. In all jurisdictions, for example, domestic uses are given priority, but the definition of domestic use varies. In most states and provinces, domestic use is limited to household uses and subsistence agriculture, but in Ohio, domestic uses include the water service demands of incorporated municipalities. In ranking secondary uses, many jurisdictions use a balancing formula to attempt to take into account a number of important factors in allocating water use.

\* *Real cost pricing* means that consumers of water pay the full cost of using water. This includes the cost of supplying water as well as treating it after its use.

Table:

“State and Provincial Water Use Policies”

This type of balancing test was criticized in the United States as inefficient and uncertain; as a result, section 850 of the Restatement of Torts (Second) has attempted to eliminate some of that uncertainty by suggesting that “the protection of existing values of water uses, land investments and enterprises” be a factor in the balancing. This incorporates some prior appropriation principles into the common law of riparian rights so that the allocation of water rights gives preference to those who first put the water resource to human use.

The common law regarding groundwater has developed independently of surface water law. This is highly problematic since ground and surface waters are two segments of one hydrological system. The common law assumed unlimited groundwater use for the owner of the surface land. This assumption in the law has been modified. To protect farmers, a reasonable use rule was developed to limit the possibility of non-overlying land owners pumping groundwater. Then the Restatement of Torts (Second) proposed a rule that would have extended this protection to include large uses by users with overlying land. This approach, which has been rejected by Indiana and adopted by Michigan, Ohio, and Wisconsin, takes a small step towards conservation by recognizing that there is not an unlimited right to groundwater use.

Québec is not a common law jurisdiction. The foundation of its water law rests in the Québec Civil Code. The code’s basic principle is that ownership of land confers proprietary rights to the land, including the right to use and enjoy the water, providing the use is not prohibited by law or regulation.

### **State and Provincial Legislation and Practices**

The accompanying table shows that there is a substantial mixture of water management regimes within the Great Lakes Basin. While all jurisdictions measure water use, the categorizations of water use are different within each jurisdiction. In addition, not all states and provinces are in a position to regulate water, either because the legislation does not exist, or because the needed funds have not been allocated to this purpose. Finally, although most jurisdictions have attempted to conform to the provisions of the charter, each state or province takes a different approach to doing so. As a result, water resources of the Great Lakes states are left vulnerable to misuse.

## **PROVINCIAL AND STATE WATER CONSERVATION PROGRAMMES**

None of the states or provinces has developed a comprehensive water conservation strategy. Illinois has gone the furthest in implementing water conservation measures. It has instituted strict regulations to require the stoppage of leaks from the water distribution system, and requiring municipalities wanting to use water from the Chicago diversion to have certain water conservation measures in place. The stimulus for Illinois to have these measures in place is clear: the Chicago diversion, the main source of water for southeastern Illinois, puts strict legal limits on the amount of water that may be withdrawn from Lake Michigan. To try to stay within these limits and still allow for growth, the state has had to institute water conservation measures.

In the other jurisdictions, some individual actions have been taken at the state or provincial level, but there is nothing comprehensive. In the early 1990s, Ontario went through an extensive exercise to develop a water conservation strategy, including substantial citizen involvement, but never adopted it and took no actions to implement the plan.

## **ABILITY OF GOVERNMENTS TO PROTECT GREAT LAKES WATER QUANTITIES**

Sustainable watershed planning requires a basinwide management plan; this means that the political system of each of the jurisdictions must adapt to the demands of the Great Lakes ecosystem. But each government jurisdiction in the Great Lakes Basin has a different management system in place to address water quantity issues. These differences continue despite the agreements they made when they signed the Great Lakes Charter.

Not only do the controls vary, but, even more significantly, some jurisdictions have very few controls over the consumption and diversion of water. None of the states or provinces has an adequate water conservation program.



# The Role of the International Joint Commission

The International Joint Commission (IJC)\* has a powerful role in the control of the movement of waters through the Great Lakes system. The primary reason for signing the Boundary Waters Treaty in 1909 was to “prevent disputes regarding the use of boundary waters.”<sup>1</sup> This treaty between the United States and Great Britain (later adopted by Canada) formed the IJC and gave it quasi-judicial powers in approving or withholding approval of applications for the use, obstruction or diversion of boundary waters on either side of the international border that would affect the natural level or flow on the other side.

In addition to exercising these decision-making powers, the IJC has periodically over its almost ninety years of existence studied the impacts of diversions, consumptive uses and fluctuating levels in the Great Lakes and made recommendations to the Canadian and U.S. governments on how to address these issues.

### THE CONTROL FUNCTIONS OF THE IJC

The Boundary Waters Treaty gave the IJC the power and responsibility to regulate the flow of waters along the boundary between Canada and the United States. Article III of the treaty provides that any diversion or obstruction that would “affect . . . the natural level or

flow of boundary waters on the other side of the line” needs the approval of not only the Canadian and U.S. governments, but also of the IJC.

In 1913, the IJC issued its first Order of Approval in the Great Lakes Basin when it approved the construction and operation of a control structure above the St. Marys Rapids at Sault Ste. Marie. This allowed for the construction of a dam for power purposes. This area has been the subject of several control orders since.

The other major area for which the IJC has issued orders of approval in the Great Lakes Basin is in the St. Lawrence River near the outflow from Lake Ontario. These likewise have been to allow for the construction of dams for power plants. The first of these was issued in 1918.

The IJC set up boards of control to oversee the implementation of these approvals through control orders. The role of the International Lake Superior Board of Control and of the International St. Lawrence River Board of Control is to regulate the flow of water through the control structures on a regular basis, usually weekly or monthly. The purpose of the regulations is to ensure a flow of water that satisfies the power generators, the navigational interests, the desires of those living both upstream and downstream and to ensure enough flow to support fish. Another

\* The IJC is a binational commission with six members. Half are appointed by the Canadian Prime Minister; half by the U.S. President.

factor that the boards of control consider in determining the flow rate is the avoidance of ice jams.

In 1950, Canada and the United States signed a treaty concerning the diversion of waters from the Niagara River through power plants and the return of those waters to the river further downstream. The IJC set up the International Niagara Committee to oversee the implementation of this treaty. The committee's main function is to oversee the distribution of flows to ensure that enough water flows over the Niagara Falls that their scenic value is not diminished and to ensure that the agreement for an equal sharing of water diverted for power purposes by Canada and the United States is adhered to. The IJC has set up the International Board of Control to issue control orders to ensure that these objectives are achieved. In 1964, the IJC issued an approval for the installation of an ice boom at the Lake Erie end of the Niagara River. The board of control yearly oversees the installation and removal of this ice boom.

This requirement to obtain approval from the IJC before installing a control structure (channel improvements, locks, powerhouses or dams) or diverting water from international waters gives the IJC substantial power to affect levels and flows and to control the diversion of waters from the Great Lakes Basin. But these powers are limited in a few critical ways.

The Boundary Waters Treaty states that the IJC's powers are not intended to "interfere with the ordinary use of such waters for domestic and sanitary purposes" and that the use, obstruction or diversion does not fall under this power provided the works are wholly on one side of the international boundary and do not "materially affect the level or flow of the boundary waters on the other [side]." It is unclear how significant the impact of a diversion must be in order to be "material" and whether the IJC has a mandate to approve or disapprove of a diversion or obstruction proposal which, although alone it is relatively small, in concert with others, would have a serious cumulative effect on the levels of the Great Lakes.

The bases on which the IJC can deny approval are highly circumscribed by Article VIII of the Boundary Waters Treaty, which outlines the principles the IJC is bound by in making its decisions. Both Canada and the United States are to have equal and similar rights to the use of the water. Preference in uses of water are to be allocated in the following order of precedence: domestic and sanitary uses first, followed by uses for

navigation, and by uses for power and for irrigation purposes. There is no mention of the needs of fish and wildlife living in the ecosystem, who are affected by changes in the natural flows and fluctuations of the waters of the Great Lakes. The treaty says that a project may be approved if there is adequate compensation for an injured interest.<sup>2</sup>

Since applications to the IJC for control structures must come through the governments of either Canada or the United States, the IJC has concluded that it is likely that a number of small diversions have proceeded without IJC approval and that these may result in cumulative and measurable effects on the water levels of the Great Lakes.<sup>3</sup> The commission has pointed out that some jurisdictions do not require permits for certain types and sizes of diversions. Since the IJC acts only when a diversion application is conveyed to it by the governments, such diversions would never come to the IJC. In addition, the IJC pointed out that sometimes Canada and the United States seek agreement from each other on a diversion and thus exempt the IJC from the process.<sup>4</sup>

The role of the IJC in controlling levels and flows in the Great Lakes Basin is also severely limited by the Boundary Waters Treaty's definition of boundary waters. The treaty covers the waters "from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof along which the international boundary . . . passes." The treaty specifically excludes tributaries that flow into these waters from the definition of boundary waters.

This definition of waters covered by the Boundary Waters Treaty was the result of a compromise between the United States, which did not want to limit its sovereignty over waters within its borders, and Canada, which wanted a commission to have jurisdiction over all waters with potential international implications.<sup>5</sup>

This definition of boundary waters means that even though Lake Michigan flows into the boundary waters between Canada and the United States, it is not included in the jurisdiction given to the IJC under the treaty because it is wholly within U.S. waters. As a result, most of the existing and likely diversions from the Great Lakes, including the largest diversion from the Great Lakes, the Chicago Diversion, are not subject to the provisions of the Boundary Waters Treaty and thus do not require IJC approval. For the IJC to have clear jurisdiction over approval of diversions through Lake Michigan, the diversion would have to be so substantial that it seriously affected

navigation on the other Great Lakes and the connecting channels. It is virtually impossible to imagine such a single, gigantic diversion.

As a result, what seems to be a major power to affect levels and flows and diversions in the Great Lakes proves to be much less than that on the surface. In 1985, the IJC expressed its frustration with the current situation. It concluded that “the international requirements under the Boundary Waters Treaty with respect to both large and small diversions of boundary waters are not explicit, nor is any consistent practice followed.”<sup>6</sup> Over its ninety-year history, the IJC has never denied a request for approval for a control works or diversion in the Great Lakes Basin.

### THE INVESTIGATIVE FUNCTION OF THE IJC

The Boundary Waters Treaty establishes a second important role for the IJC—that of an investigator. The IJC is mandated to investigate and make recommendations to the Parties on “questions or matters of difference” when such issues are referred to it. These investigations, known as “References,” have given the IJC an important role to play in water quantity issues.

The IJC has prepared several significant studies on water levels, quantity, consumption and diversions in the Great Lakes. The most significant of these have been *Further Regulation of the Great Lakes* in 1976, *Limited Regulation of Lake Erie* in 1983, *Great Lakes Diversions and Consumptive Uses* in 1985, and the *Levels Reference Study: Great Lakes–St. Lawrence Basin* in 1993.\*

The IJC has performed an extremely important investigative role and has done an excellent job at pointing out the direction for solving water quantity issues, just as it has under the Great Lakes Water Quality Agreement for toxics issues. Its 1993 *Levels Reference Study* demonstrated the ability of the IJC to point out the need for a preventive approach to water quantity issues, and to help coordinate the various interests around the Basin.

The governments made this reference to the IJC in 1986 at a time when high water levels were alarming people living along the shores of some of the lakes—especially Lake Erie—who were seeing their docks washed out and feared that their homes or cottages would be washed away. Many of these people were calling on the governments to install substantial control mechanisms in the Great Lakes system to

control water levels. The IJC conducted a major study, including substantial public consultation through the setting up of a citizens advisory committee and holding seventeen public events.

In its final report in 1993, the IJC rejected large-scale regulation of the Great Lakes through engineering techniques, and recommended instead that more small-scale preventive measures be implemented. These included: land use planning, the relocation of dwellings to non-hazard areas, the flood proofing of existing structures, and emergency preparedness.

However, the IJC has clearly pointed out the limitation in its ability to affect how water quantity issues are addressed through the references mechanism. The IJC states that its recommendations under these references are “not binding on the governments, and can be modified or ignored.”<sup>7</sup>

### THE GREAT LAKES WATER QUALITY AGREEMENT AND WATER QUANTITY ISSUES

The Great Lakes Water Quality Agreement (GLWQA), which was first signed by the Canadian and U.S. governments in 1972, committed the governments to reduce eutrophication of the Great Lakes through controls on phosphorus releases and to protect the health of all life in the Great Lakes by Basin eliminating the discharge of persistent toxic substances. The IJC was given the role of evaluator of government progress in achieving these goals.

A fundamental principle adopted in the GLWQA is the ecosystem approach. This means that the important relationship between water quality and water quantity issues should be explored under the GLWQA. For example, water conservation efforts are central to reducing the discharge of toxic substances and phosphorus from both point and non-point sources. Decreased water levels would result in the exposure of contaminated sediments and their accelerated release to the environment. Unfortunately neither the governments nor the IJC has seriously explored this critical relationship.

### THE FUTURE ROLE OF THE IJC

The IJC is in a unique position to play a lead role in urging a proper and serious response to the water levels, quantities and diversion issues in the Great

\* These were the result of references from the governments in 1964, 1977, 1977, and 1986, respectively.

Lakes. It has the experience and skill to adopt a basinwide, ecosystem approach to the issue, taking into account all factors that impact water quantity, including climate change, the privatization of water infrastructure, trade agreements, and continental water depletion.

The IJC began this enormous task in 1985 when it released its report *Great Lakes Diversions and Consumptive Uses*. Here it examined climate change, world food supply and demand, the changing economy in the Great Lakes Basin, and the impact that this may have on the water supply in the Basin. The IJC questioned . . .

whether the institutions of government are in a position to make thoughtful and forward-looking decisions about the use of water, should the need arise. We know with little precision the present and future uses and values of Great Lakes water. Policies should therefore provide adaptive mechanisms for dealing with change and the unexpected.<sup>8</sup>

Unfortunately, twelve years later the IJC could quite accurately write the same conclusion. As has been shown in chapter 5, governments have not made enough progress in addressing these issues.

On the basis of the work the IJC has already carried out in this field, the IJC should go beyond pointing out the problems in water levels, quantity and diversions; it should also more seriously assess the activities of the governments in this field, especially

the implementation of the Great Lakes Charter. It should take a leadership role in developing the components of a Sustainable Great Lakes Water Strategy and in urging the governments to adopt such a strategy. The IJC should then play a strong role in evaluating progress in implementing such a strategy.

This role can be partially carried out through the auspices of mandates the IJC currently has under the Great Lakes Water Quality Agreement. It would be preferable, however, if the governments broadened the IJC's mandate to develop such a strategy by giving the IJC a reference to do so.

In addition, the IJC should seriously assess the way in which it carries out its current role under the Boundary Waters Treaty to approve diversions and approve and control the functioning of control structures in the Great Lakes Basin. The IJC should ensure that decisions on controls and diversions take into account basinwide and long-term needs. Once a Sustainable Great Lakes Water Strategy is

developed, this should be the document that guides the IJC in making these decisions.

The IJC should also ensure that the public is fully involved in reviewing applications to it for approval of control structures and diversions and in the implementation of control orders. The IJC's public consultation sessions in late 1995 and early 1996 considered a new control plan for the St. Lawrence River is a good example of how this can be done.

In these ways the IJC will be able to play a significant role in preventing a serious water shortage in the Great Lakes Basin.

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**The IJC should take a leadership role in developing a Sustainable Great Lakes Water Strategy and in urging the governments to adopt it**

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## The Rights of the First Peoples

You have heard from speakers who see water as just another “resource”—something to be captured or tamed, put in containers or otherwise diverted from its natural path, and transported far away to be used and sold for money.

To First Nations people, however, water is seen very differently. A creek, which to a non-native person may be seen simply in terms of flow rates and acre-feet per year, may have a special name and spiritual significance. It may be a private bathing place for special ceremonies or initiation rites, or in some cases be owned by a particular individual or family. It not only physically and spiritually cleanses people, but it also cleanses the earth and, eventually, the sea to which it inevitably flows, if left alone.<sup>1</sup>

—Chief Kathy Francis  
Klahoose First Nation  
Squirrel Cove, British Columbia

### THE FIRST PEOPLES OF THE GREAT LAKES BASIN

The first people to inhabit the Great Lakes Basin arrived about 10,000 years ago. It is estimated that their numbers were between 60,000 and 117,000 in

the sixteenth century when the first Europeans arrived.<sup>2</sup>

Today, approximately 350,000 of the descendants of the first peoples of the Great Lakes Basin live in 110 nations on the approximately three million hectares (seven million acres) of federally recognized reserve lands in the Great Lakes–St. Lawrence River Basin.<sup>3</sup> Approximately 60 percent of these people live along the shorelines, mainly at the narrowing points of the connecting channels. Many more of their descendants live off the reserves, most of these in urban centres.

The worldview of the First Nations people differs dramatically from that of the Western society that has come to dominate activities and decision-making in the Great Lakes Basin. Henry Lickers, director of the environmental division of the Mohawk Council of Akwasasne, located in the St. Lawrence River, described this difference in the following way:

The First Nations people view themselves not as custodians, stewards or having dominion over the Earth, but as an integrated part in the family of the Earth. The Earth is my mother and the animals, plants and minerals are my brothers and sisters.

We are not even older siblings within the Earth’s family but are the youngest brother or

sister. The rest of the Earth could do quite well without the youngest brother or sister, but we could not exist without the family. As the youngest brother of the Earth, we must approach the Earth and everything in it with the respect and awe of a younger brother.<sup>4</sup>

The changes that the Europeans have wrought on the flows of the waters of the Great Lakes Basin have had devastating impacts on the First Nations of the Basin. Major construction projects to change the flows of the waters have irreparably disrupted communities. For example, the construction of the locks and new channel for the St. Lawrence Seaway separated the Mohawk people at Kanosatake from their lifeblood—the St. Lawrence River. The dams that have been built in various places around the Great Lakes have interfered with the natural fluctuations of the rivers. This has disrupted the wetlands and destroyed the rich diversity of life in these places. These wetlands are central parts of the spiritual, cultural and economic wellbeing of the First Nations.

Contamination of Great Lakes Basin waters has had devastating impacts on the health of these peoples and forced them to change their lifestyles, breaking their intimate connection with the nature around them and changing their cultural, social and economic activities.<sup>5</sup> As Kenneth Jock, a Mohawk environmental director, said: “The cost to our traditions has been very high. Our children think fish come from the supermarket instead of their father’s net.”<sup>6</sup>

## THE RIGHTS OF THE FIRST NATIONS

First Nations peoples have a worldview very different from that of the Europeans who colonized North America in the sixteenth century. This different worldview and way of life has until recently been given very little, if any, respect by the colonizers. As Mary Turpel noted:

No government has ever dealt with Aboriginal Peoples on an equal basis—without seeing us as a means to an economic goal (settlement and development), as noble savages, the pagans without civilization, or as specimens for anthropological investigation and scientific collection.<sup>7</sup>

The release in November 1996 of the *Canadian Report of the Royal Commission on Aboriginal Peoples* tells

us that the legacy of colonialism continues to have dramatic effects on the lives of First Nations peoples. This report makes four hundred recommendations, including one that an additional \$1.5 billion to \$2 billion be spent on First Nations peoples each year for the next twenty years to improve the quality of their lives.<sup>8</sup> The lives of large numbers of First Nations peoples is one of poverty.

In 1763, First Nations rights were formally recognized in North America through a British Royal Proclamation that set aside lands for aboriginal people and established the responsibility of the British Crown to deal directly with aboriginal peoples.

The United States Constitution followed the precedent of the Royal Proclamation and held that the federal government was to govern commerce with “Indian Tribes.” During the 1800s the United States entered into many treaties with sovereign tribal nations. Through a series of treaties, numerous bands ceded land to the U.S. government. Many of these treaties were signed by these nations to negotiate peace. However, the cession of land was not understood by the First Nations and Tribes to include the ceding of the waters adjacent to and flowing through their lands.

The signers of these treaties on behalf of the Tribes understood that “these treaties were signed between equal nations.”<sup>9</sup> To them this meant that they were maintaining their sovereignty. Since for the most part their cultures are based on oral traditions, the Tribes understood that their sovereignty was protected under the treaties because they were told so by the U.S. government. Unfortunately, this was not the U.S. understanding, nor was it actually written into the treaties. Instead the United States felt that it simply gave these peoples rights to live, hunt, fish and gather on small areas of land known as reserves. For the Tribes, this is a complete misunderstanding. The Great Lakes Indian Fish and Wildlife Commission addresses this misconception:

The treaty rights are not new, nor were they rights which were given to the Chippewa. The Chippewa simply never sold or gave away those rights.<sup>10</sup>

Recently, some government jurisdictions in the United States, such as the U.S. federal government, have made more serious efforts to recognize the sovereignty of the Tribes over their own lands and have included the Tribes as so-called equal partners in consultation on policy development matters, especially policies relating

to the environment. Nevertheless, for the most part the Tribes find these efforts inadequate and usually no more than token in nature.

A similar situation exists in Canada. In an effort to rectify past wrongs, in August 1991, the government of Ontario and the Chiefs of Ontario's First Nations signed the "Statement of Political Relationship," which recognized that "the First Nations . . . exist in Ontario as distinct nations, with their government, cultures, languages, traditions, customs and territories." In constitutional discussions in 1992, the provincial and federal governments unanimously recognized the First Nations' inherent right to self-government. Progress on this commitment has been very slow, but in British Columbia and a few locations across Canada, bands themselves are taking action and "are already drafting specific treaties to define their self-government, economic development, cultural preservation, compensation, and recognition as being distinct."<sup>11</sup>

In the Canadian Constitution (1982), aboriginal and treaty rights are recognized and affirmed. In 1993, the *Sparrow* decision, the first Supreme Court of Canada decision interpreting this part of the Constitution, found that the British Columbian Musqueam Band had a collective constitutional right to fish for food; the Supreme Court here also showed concern for the conservation of fish. This decision appears to indicate the possibility of arguing for constitutional protection of traditional aboriginal water rights in Canada.

Another major ongoing area of conflict between the First Nations and Tribes and the non-aboriginal people in the Great Lakes Basin is over the extent of First Nations lands. The two sides frequently do not have a common understanding of just how much land the First Nations and Tribes ceded to the European colonizers. This is a cause of bitter conflicts in many locations in the Great Lakes Basin.

### **Tribal Rights to Use of Water in the United States**

The most important court decision regarding aboriginal rights to the use of water in the United States is *Winters v. United States* (1908). This case established what has become known as the Winters doctrine. This stated that when the United States recognized a Tribal reservation, it automatically legally

reserved sufficient water with the land in order to fulfil the purpose for which the reservation had been created.<sup>12</sup>

In the *Winters* case, the United States, on behalf of the Assiniboine and Gros Ventre tribes, brought suit against upstream settlers who had appropriated water from the Milk River after the reservation was established but before the occupants of the reserve had made much use of their water. The government argued that, incident to the establishment of the reservation, sufficient water had been reserved by implication to satisfy the requirements of the reservation. Regardless of the evidence presented by the settlers that their economy would be severely damaged or destroyed if the Tribes' rights to use of water were sustained, the U.S. Supreme Court affirmed the lower courts'

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## **The U.S. Supreme Court affirmed decrees preventing settlers from interfering with the Tribes' use of water**

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decrees preventing the settlers from interfering in any way with the Tribes' use of water from the river.

Although the Winters doctrine is clear, it has not removed conflicts over tribal rights to use of water in the United States. The problem is created by the fact that reserved rights are largely unquantified and often have not been used in the past to their full extent. Over the past decade, cases regarding aboriginal water rights have flooded United States courts, pitting those with state-granted rights against tribes invoking their federally reserved rights.<sup>13</sup>

The other issue that recurs is over the rights of the Tribes to affect decisions in "ceded territory," i.e., lands that the Tribes gave or sold to the Europeans when they signed the treaties. Recognizing that the environment in the Tribes remaining lands cannot be separated from the environment in the ceded territories, the tribes are "concerned with the health and integrity of ecosystems which sustain fish, wildlife, and wild rice in territories ceded."<sup>14</sup> The Great Lakes Fish and Wildlife Commission was formed by the Chippewa Bands in Michigan, Minnesota and Wisconsin to "manage off-reservation resources and tribal seasons."<sup>15</sup>

### **First Nations Rights to Use of Water in Canada**

Disputes over First Nations rights to use water have been less frequent in Canada than in the United States. In Québec, First Nations water rights resulted in conflict when that province proposed to inundate

aboriginal lands with water for the James Bay power project. In other parts of Canada, disputes over water tend to focus on fishing rights.

Usually, disputes over First Nations rights to use water in Canada have been resolved on the basis of principles similar to the Winters doctrine in the United States. In Canada, the rule devolves to how treaties and other agreements with First Nations peoples will be interpreted:

The treaties and agreements with Indians in Canada promised lands for farming and other developments, and the maintenance of hunting, trapping, and fishing. Ordinary principles of interpretation require that water rights be implied in the undertakings given by the Crown. Without water rights, the promises made by the Crown cannot be fulfilled.<sup>16</sup>

The law recognizes that the First Nations possess rights to hunt, trap, and fish arising from aboriginal title and treaties. There is an extensive body of jurisprudence that indicates the manner in which those rights to hunt, trap, or fish may be exercised and to what extent, if at all, they are subject to federal or provincial regulation.

The Constitution Act of 1982 states that “the existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby affirmed.” As a result, provincial legislation cannot authorize the infringement of a treaty right to fish, and federal legislation must give priority to the First Nations rights to fish as “constitutionally protected.”

A major current area of dispute is over whether the right to hunt, trap and fish extends beyond undertaking these activities for direct use by First Nations peoples to the right to hunt, trap and fish for trade and commerce.

Implicit in the right to hunt, trap and fish is the non-consumptive use of water for these purposes. Accordingly, aboriginal people maintain a right to stop water uses that would interfere with their rights to hunt, fish and trap, irrespective of the application of provincial water resources legislation.

## CLEAR RIGHTS—UNCERTAIN FUTURE

Although their rights seem clear, the First Nations and Tribes have had great difficulty in asserting their rights and in getting the rest of society to acknowledge those rights and to take into account the special relationship of the First Nations to the waters of the Great Lakes when they make decisions.

### James Bay Power Project

Mega-projects that divert or change the flow of water have almost always resulted in settlements that vitiated these rights, giving paltry recompense in return. The most famous water rights agreement made between aboriginal peoples and the Crown in Canada is the James Bay Agreement. After a protracted battle against the province’s proposed James Bay Power Project, the northern Cree finally gave in, “feeling that a gun was pointed at their heads.”<sup>17</sup> Chief Matthew Coon-Come has stated:

The agreement contains no gifts. It has simply given the Cree people what other Canadians have enjoyed for years: basic rights such as citizenship, schools, health care, control over municipalities, as well as ensuring the rights we have enjoyed since time immemorial—hunting, trapping and fishing.<sup>18</sup>

Billy Diamond, who was twenty-two years old and newly appointed chief of the Rupert House Crees when the struggle against the dam began, has said:

If I had known in 1975 what I know now about the way solemn commitments become twisted and interpreted, I would have refused to sign the agreement. Protection of the environment in Northern Québec has been a farce.<sup>19</sup>

As is too often the case, the legal rights of the First Nations could not stand in the face of overwhelming political pressure, and were insufficient to ensure sustainable use of the environment. This type of situation has been repeated over and over again on small and large scales.

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**Provincial legislation  
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### **Crandon Mine Proposal**

An example of a current proposal that ignores the rights of the First Nations and Tribes is the proposal by Exxon and Rio Algom for a zinc and copper mine at the headwaters of the Wolf River near Crandon, Wisconsin. Over its twenty-five-year lifetime, the mine would generate about 44 million tons of wastes, which it proposes to store in ponds over a hundred feet deep. The mine's proponents also propose to pump groundwater from the area into the Wisconsin River and thence into the Mississippi River watershed.

The Mole Lake Reservation sits directly below the proposed Crandon mine site. Its residents fear that the mine will contaminate the Wolf River and that the diversion will seriously affect the area's water flows. The proposed mine would be both an ecological and a cultural disaster for the Mole Lake Chippewa because it would destroy their wild rice harvest areas. In their analysis of Exxon's proposed mine, the Wisconsin Department of Natural Resources describes the integral importance of wild rice to Chippewa culture:

Rice Lake and the bounty of the lake's harvest lie at the center of their identity as a people . . . The rice and the lake are the major link between themselves, Mother Earth, their ancestors and future generations.<sup>20</sup>

### **Resistance to First Nations' Rights**

Acting in their capacity as sovereign nations, Great Lakes First Nations and Tribal communities are increasingly declaring and acting upon their rights to jurisdiction over and management of Great Lakes waters. To assert this sovereignty, these Nations are reasserting and reactivating their own plans for the protection and use of the waters of the Great Lakes.

The major barrier to the success of these efforts is the ongoing resistance of the non-aboriginal peoples to accepting the full implications of the sovereignty and rights of the First Nations and Tribes. It is essential that all governments and organizations around the Great Lakes recognize and work on the basis of the recognition that the First Nations and Tribes are nations and should have the special rights accorded to nations. In recognition of this, in 1991, Great Lakes United's membership revised their bylaws to designate a seat on the board of directors for a representative of the First Nations and Tribes.

In addition, non-aboriginal people must recognize that, if sovereignty is to be meaningful, its exercise has implications far beyond the lands that are still held by the Tribes and First Nations. It is impossible to deal with environmental issues in a restricted area.

Decisions that affect the flows and levels and quality of water in parts of the Great Lakes Basin beyond the boundaries of First Nations and Tribal lands also affect the waters within the territories of the First Nations and Tribes. Therefore, a unique role must be recognized for the First Nations and Tribes when decisions are made in the Great Lakes Basin.

### **NON-ABORIGINAL RELATIONS WITH FIRST NATIONS**

In making decisions affecting water levels and flows, we must:

- Recognize that the traditional practices of First Nations and Tribes have much wisdom from which non-native communities must learn as we search for solutions to environmental problems.
- Recognize the rights of First Nations and Tribes to the waters of the Great Lakes and work to ensure that these rights are restored and that future decisions foster these rights.
- Consult with First Nations and Tribes on all matters affecting levels and flows, and give them the power to veto actions that would negatively affect their spiritual, cultural, physical and economic wellbeing.
- Ensure that representatives chosen by First Nations and Tribes are equal partners with the U.S. and Canadian governments on all the bodies that make decisions affecting Great Lakes levels and flows.

Not only are these actions essential for the wellbeing of the first peoples of the Great Lakes Basin; they also are essential for the wellbeing of all the other residents of the Great Lakes Basin. The First Nations bring a knowledge and perspective to environmental decision-making that is far deeper than that brought by non-aboriginal peoples. For example, it has become clear that the Nawash fishermen and elders in the Bruce Peninsula in Lake Huron are years ahead of the Ontario government scientists when it comes to understanding the negative impacts that stocking salmon in Georgian Bay is having on the other fish in the area. At the 1995 Nawash Fishing Conference, it became clear that Native traditional knowledge had anticipated progressive current scientific ecosystem thinking by several thousand years.<sup>21</sup>

To integrate a perspective into decision-making that respects Mother Earth, the non-aboriginal peoples must learn from and include the First Nations and Tribes in all their decision-making.



# **Stresses Building into the Next Millennium**





## Growth: Are There Limits?

Sustaining the sweetwater seas requires that water be conserved, not squandered; that communities be planned around the availability of water resources; and that storm and waste waters be managed as a resource, not discarded as a waste.

Municipalities often bear the greatest responsibility among Great Lakes governments for planning the growth and development of communities and for the provision of water supply and treatment services to support that growth and development. Therefore, it is essential that municipalities be included in the development and implementation of water management strategies.

### GROWTH AS THE GREATEST GOOD

A primary motivator in the decision-making of municipal councils has long been to see their community grow. In the first half of this century, civic pride was based on the number of smokestacks in the community spewing out black smoke. This meant growth and prosperity. Today the delight in smokestacks has been replaced by an equally environmentally destructive pride in seeing ever more residential subdivisions, shopping malls and industrial “parks” popping up on the edge of town.

Often the main barrier that municipalities run into

as they pursue more growth is a lack of water to supply to their expanding populations and new commercial and industrial enterprises. The solution they often turn to overcome this problem is to divert water from somewhere else. As a result, the water diversion issue throughout this basin is really a development issue. Rather than defining the problem as a lack of water, it is necessary to realize that the problem is excess growth.

Municipalities often fail to realize that obtaining a water supply is not the only factor immediately limiting their ability to grow. Having received the water, they have to find a place to discharge the water once it has been used and turned into waste. Recently, the provincial government in Ontario reviewed the natural limitations on growth in south central Ontario—the area from Orillia through Kitchener-Waterloo to Brantford. They concluded that:

A water supply based on a major Great Lakes pipeline is in itself unlikely to provide long-term answers to area servicing concerns because the ultimate growth limits are likely to be caused by sewage assimilation capacity of the receiving lakes and streams.<sup>1</sup>

In addition, and perhaps of even greater consequence, is the impact on local waterways from the excess

runoff caused by the concrete and pavement that cover urban surfaces and the disruption of natural flow patterns.<sup>2</sup>

Even this recognition of natural limits to acceptable growth fails to take into account the other major impact of untrammelled growth—the consumption of more water and the transformation of this water into contaminated waste water. Human demands for more water to consume and to flush away our wastes and for land to build on compete with the needs of the non-human inhabitants of the ecosystem. Human activity also disrupts the natural flows and rhythms of the waters of the Basin.

One of the motivating factors for municipal decision-makers behind their desire for growth is to expand their tax base. Growth by urban sprawl may show short-term increases in tax revenues, but the services required to support far-flung and thinly populated subdivisions exact high costs for the provision and long-term maintenance of water supplies, roads, sewers, schools and hospitals vastly out of proportion to tax revenues. A study in the Toronto area concluded that adopting more compact development forms over the next twenty-five years would reduce “capital investment required for roads, transit, water and sewer services by an estimated \$10 billion to \$16 billion, and decrease operating and maintenance costs by \$2.5 to \$4 billion.”<sup>3</sup>

Excess growth also means creating huge burdens for future generations. We force them to develop ever grander schemes to divert waters into their area and to deal with the wastes they create.

## THE SUSTAINABLE COMMUNITY

Rather than looking for the quick fix of bringing in water to allow ongoing growth, we need to plan our communities to be sustainable in the long run. This means recognizing and accepting that there are natural limits to growth.

This requires a redefinition of progress. Chris Maser, defines progress in his book *Community Sustainable Development*:

For society to progress, decisions must be made that recognize and respect the requirements and rights of future generations, as well as the requirements and intrinsic value of all species and the Earth's carrying capacity with respect to its human population. (Carrying capacity is the number of individuals that can live in and use a

particular landscape without impairing its ability to function in an ecologically specific way). This position is very different from our blind faith in material progress, which we think of as development.<sup>4</sup>

In order to plan on the basis of sustainability, we need to plan at a watershed level. Watershed planning is planning according to the water resources of a region, taking into consideration all of the elements of the region that are dependant on the resource, and planning with the presumption that all of these resources will be protected.

It is important to consider the sustainability of these resources, and to manage them as effectively as possible, so that future generations will not need to bear the cost of needed remediation works. Effective water management now will maximize opportunities for the development of economically sound communities while maintaining the integrity of the ecosystem.<sup>5</sup>

The most important element of sustainable water management is the entrenchment of the understanding that settlement should be limited to where water supplies exist. It is no solution to water shortages in a region to pipe it from somewhere else. Sustainability means leaving our pipe dreams in the past, and properly managing the water resources available in any given region. Only in exceptional circumstances and only after full public discussion at a basinwide level might an area be “released from the constraints” of local water supply and discharge capacity.<sup>6</sup>

This principle must be applied not just within the Great Lakes Basin. Expectations for growth, and depletion in quantity and quality of local waters have made some municipalities just beyond the Great Lakes Basin want to divert waters from the Great Lakes. A study carried out by Great Lakes United investigated the potential for American cities just beyond the watershed to make demands on Great Lakes waters. It found that four metropolitan areas—the Akron-Cleveland, the Milwaukee-Kenosha, Chicago-northwest Indiana area and New York City—all showed high potential for demanding future diversions.<sup>7</sup> Some areas far beyond the Great Lakes look enviously to the Great Lakes to keep their dreams of growth going. Does it make sense to pipe huge quantities of water into the deserts of the southwestern United States so they can have rapidly growing populations, green lawns and golf courses?

One of the most effective ways to forestall these

potential demands is to have a sustainable water management system that includes watershed-based land use planning that recognizes and accepts natural limits to growth, and integrated water conservation strategies that make the most efficient and effective use of the waters that are available.

## WATER USE CONSERVATION

A vice president of the World Bank has observed:

The water problem in most countries stems not from a shortage of water, but rather from its inefficient and unsustainable use. We need to change our attitudes toward water and stop wasting it the way we do.<sup>8</sup>

After agricultural usage, municipal water systems that supply water to residential, industrial and commercial customers are the largest consumers of water in the Great Lakes. This is also the most highly treated use of water because it is for human consumption. It is, as a result, the most expensive water use.

Municipal planners have typically projected future water demands based on the rate of growth in per capita water use and the projected population growth. They then plan to meet this estimated demand by

finding new water sources to tap into. Rarely have planners focused on reducing water demand as a way to balance the long term supply-demand equation and, as a result, concluded that new taps do not have to be opened.<sup>9</sup>

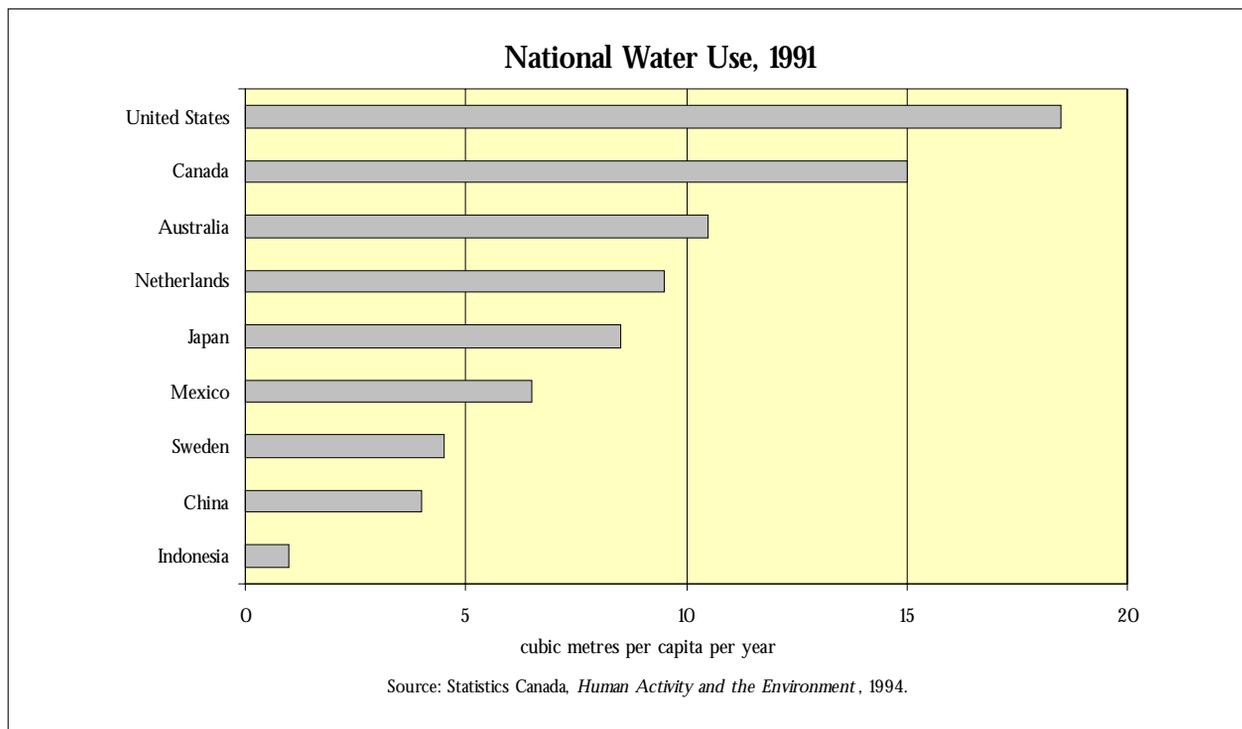
The potential to reduce water demand in Canada and the United States through conservation is substantial. These two countries have the highest per capita water use in the world.<sup>10</sup> In 1991, per capita use in the United States was 18 cubic metres (635 cubic feet) per year; in Canada, it was 15 cubic metres (530 cubic feet). This compared with a little more than 10 cubic meters (353 cubic feet) in Australia, just less than 10 in the Netherlands, 8 (282) in Japan, and just less than 5 (176) in Sweden.

These figures show that we are extremely wasteful of water. Given the comparative figures with other countries, it is quite realistic to set a goal of 50 percent reduction in per capita use of water in Canada and the United States by 2005.

A combination of methods have proven effective in achieving water conservation:

### Reducing leakage in the water delivery system

Most of the waterworks in Canada and the United States are extremely old, resulting in a great deal of leakage. In Canada, most of the underground sewer and water pipes were built just after World War II;



17 percent of the sewer pipes are more than seventy-five years old.<sup>11</sup> In the Hamilton area, between 5 and 16 percent of the water that leaves the water treatment plant is lost through leakage.<sup>12</sup>

To address this problem, it is essential to put leak detection systems into place and to repair and upgrade water pipe distribution systems. Illinois has instituted strict regulations on unaccounted for losses of water from their system—primarily through leaks. Illinois estimates that, as a result, it has achieved a reduction in these unaccounted for losses of water from 10.4 percent of total water distributed in 1979 to 6.9 percent in 1988; this has saved approximately 87 million litres (23 million gallons) per day of water. This is enough to provide water to 180,000 users.<sup>13</sup>

### **Metering of all water users**

Many municipalities—both large and small—in the Great Lakes do not meter water usage. The City of Chicago, for example, one of the largest communities in the Basin, still has a number of one- and two-family dwellings that are not metered. Toronto and Hamilton are in similar situations.

Metering is an essential component of a water conservation strategy because it allows for a better understanding of how water is used and when water is being lost in the system. Meters are also essential for charging consumers based on how much water they use. The installation of water meters can reduce water usage by 15 to 20 percent.<sup>14</sup>

### **Public education**

Residents in the Great Lakes Basin tend to feel that there is such a bounty of water here that they do not need to conserve water. Education is essential among all sectors of society to show them that this is not true and to point out what they can do to conserve water. Industries, commercial operations, institutions, farmers and residents must be encouraged to use less water in performing the same function, and to perform the function less often.

### **Retrofitting**

Water use fixtures should be retrofitted with devices that conserve water. Many municipalities have programmes that subsidize the cost of installing low-flow toilets, faucet aerators and low-pressure showerheads. Simply installing these devices in all homes would reduce residential water consumption by at least 30 percent.<sup>15</sup> Retrofitting of institutions such as schools and hospitals and of industries can add dramatically to water conservation efforts.

### **Regulations to require water conservation**

A diversity of regulations can be used to support conservation programmes. These can include plumbing codes requiring the use of water-saving devices and bylaws that restrict lawn watering. Illinois has put in regulations that require a municipality seeking a water allocation from Lake Michigan to adopt a multifaceted local plumbing code or ordinance that includes mandatory metering for new services and water recycling systems for new or remodelled car wash facilities.<sup>16</sup>

### **Pricing of water**

Water pricing can be used to change the behaviour of water users by making them realize that when they waste water they are wasting money.

When water is underpriced, both consumers and suppliers of water using equipment are given the message that water is not a valuable resource. This means that water users have few incentives to improve efficiency or reduce use or to use new water conserving technologies. Underpricing also results in the overbuilding of water supply and treatment systems, revenue shortfalls for water and sewage authorities, neglect in the maintenance of water and sewage infrastructure, and the overloading of waste treatment facilities, which reduces their effectiveness in treating pollutants.

Water pricing mechanisms are discussed in more detail in chapter 9.

#### **THE CONNECTION BETWEEN ENERGY CONSERVATION AND WATER CONSERVATION**

Energy conservation is essential for the protection of the levels and flows of the Great Lakes. Almost 98 percent of the water used in the Great Lakes is for power production—hydroelectric, fossil thermoelectric and nuclear thermoelectric power.

Although most of this is returned to the Great Lakes, it is highly disruptive to the natural flows of the rivers in the Great Lakes and to aquatic life in those waters or along the shores of the lakes and rivers. Energy conservation and the use of alternative energy sources, such as solar and wind power, are essential for the protection of the waters of the Great Lakes.

## **Stormwater and Wastewater Management**

Human growth and development can interfere with the natural replenishment of the waters of the Great Lakes ecosystem in many ways.

In areas where human activity has not altered the natural landscape, precipitation infiltrates through the soil to replenish groundwater. Groundwater in turn continuously replenishes the surface waters of the Great Lakes. Human settlements and land use have changed the paths of water within the Basin and disrupted these natural flows. In addition, human activities have made surface areas less permeable as soil is compacted or covered with asphalt, and destroyed the earth's natural holding tanks—wetlands. This results in more rapid surface runoff, which rushes through the system and is no longer available to replenish the ecosystem.

Runoff increases 40 to 50 percent in suburban areas and 90 to 100 percent in fully urbanized areas.<sup>17</sup> This is the result of covering once permeable soils with roads, sidewalks, and parking lots. Topsoil is removed and deep-rooted plants, such as trees, that help the waters to flow deeply into the ground are replaced with shallow-rooted lawns. Natural drainage channels are replaced with culverts and storm sewers that speed the flow of water away from the earth.

The most common method of disposing of stormwater in urban areas is through the concrete and steel infrastructure of gutters, drains, catchbasins, and underground storm pipes that attempt to get rid of the water as quickly as possible. As stormwater moves along the surface, it picks up not only naturally occurring substances but all the polluting substances also found there. For example, the most polluted watercourse in Canada, the Don River, which is in the Lake Ontario watershed, has stormwater as its largest source of pollution.<sup>18</sup> As areas within the Basin become more urbanized, larger quantities of highly polluted stormwater enter the lakes.

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**Rather than being seen  
as waste to be  
gotten rid of quickly,  
stormwater, handled  
according to  
regeneration principles,  
becomes a means of  
creating diverse and  
beautiful places.  
In urban areas, they  
profit the human  
community as well as  
enhancing the  
natural one**

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To manage these large quantities of stormwater, reservoirs and channels have been used to replace streams with structures that hold larger quantities of water. Channels constructed of concrete, rock or rock-filled baskets are designed to move large amounts of water down the stream very quickly. These structures can be very harmful to sensitive aquatic ecosystems and to fish habitat.

In many parts of the Great Lakes, combined sewer pipes carry both stormwater and human sewage to sewage treatment plants for treatment before discharge to a river or lake. This overloads the sewage treatment plants resulting in overflow of stormwater contaminated with sewage either at the treatment plant or at overflow points before the waters even get to the treatment plant.

On the one hand, the infrastructure that is now in place to quickly dispose of stormwater robs the land and groundwater aquifers of precious resources. On the other hand, once this water hits the ground, it becomes so polluted that simply sending it straight to the rivers becomes problematic.

The waters are also polluted by the numerous septic systems in the Basin. There are almost one million in Ontario alone.<sup>19</sup> Septic systems, if properly installed in the proper soil conditions and if not overloaded, can do a reasonable job. But unfortunately, they frequently do not meet these standards and contaminate ground and surface waters.

In addition, septic systems cannot handle the toxic substances that go into them. A study of 120 septic systems in Indiana showed that 79 percent of them had traces of toluene, a powerful chemical used for household uses.<sup>20</sup> The problems around the issue of septic systems are so large, yet not fully appreciated, that they have been referred to as a “sleeping giant.”<sup>21</sup>

Likewise sewage treatment plants are limited in their abilities to return clean water to the Great Lakes from the residential, institutional and domestic users

of the sewage system.<sup>22</sup> And these discharges are added to by direct industrial discharges to the lakes and rivers of the Great Lakes Basin.

As the authors of a major study on the waterfront along Lake Ontario's northeastern shore concluded:

Rather than being seen as a waste to be gotten rid of quickly, stormwater, handled according to regeneration principles, becomes a means of creating diverse and beautiful places. In urban areas, they profit the human community as well as enhancing the natural one.<sup>23</sup>

Alternative ways of stormwater and wastewater management need to be instituted. These include:

- Separating stormwater sewage pipes from sanitary sewage pipes.
- Restoring wetlands, marshes and natural streams to control stormwater runoff.
- Instituting water conservation measures that reduce water use and, as a result, reduce discharge of waste water from human sources.
- Eliminating and reducing the use of harmful substances to keep them out of the waste stream.
- Creating natural systems, such as wetlands or "living machines," to treat human wastes.
- Putting more porous natural surfaces into residential, commercial and industrial developments.
- Reforesting urban areas.
- Disconnecting eavestroughs or gutters from the sewer system.

The result of these changes will not only help improve water quantity and quality issues in the Great Lakes Basin. It also will improve the environment and the aesthetics of urban areas.

## AGRICULTURAL USE OF WATER

Use of water for drinking water for livestock and for irrigation of crops combine to make agriculture the largest consumer of water in the Great Lakes. Despite this, little focus has been put on the consumption of water by agricultural uses.

Agricultural users are generally recognized as the most wasteful consumers of water. The Commission for Environmental Cooperation set up under NAFTA estimates that water inefficiency in agriculture is between 40 and 60 percent.<sup>24</sup> Irrigation practices are

particularly wasteful.

Irrigation is expected to increase substantially in the Great Lakes Basin. For example, Michigan State University predicts that 85 percent of the total agricultural land in the Saginaw Bay area of Michigan will eventually be irrigated.<sup>25</sup>

A major emphasis must, therefore, be put on implementing measures to reduce agricultural consumption of water. Such measures must include:

- Education on more efficient irrigation methods, such as drip irrigation.
- Requiring farmers to pay full costs for irrigation systems and the water they use.
- Including in permits for water withdrawals requirements to use efficient irrigation methods.

## THE FUTURE

For far too long, we in the Great Lakes have taken the perspective that water is plentiful. We have also believed that the wastewater produced when this water is used can and should be disposed of quickly and relatively easily back into the receiving waters. Experience has shown that this is not the case: water is not so plentiful and polluted waters are not so easily cleaned up. This is why nature's cycles slowly return water to underground aquifers and lakes.

All these stresses caused by human development have a cumulative effect on ground and surface waters. As groundwater is diminished and polluted, it no longer replenishes and purifies surface waters. Pollution and drawing down of groundwater also leads communities to turn to the Great Lakes for alternative sources of drinking water.

The response to these realizations should not be more capital-intensive attempts to bring greater volumes of water wherever it is requested, and to transfer large volumes of dirty water back to the lakes as soon as possible. Instead, municipalities and citizens should work toward local solutions that reduce the amount of water we use, stop interfering with nature's water cycle, and help us clean up our waste.

What is needed is a change from a short-sighted perspective that tries to control the waters of the Great Lakes for human benefit to one that accommodates human patterns of living and growth to the ecosystem's cycles, attempting to sustain all Great Lakes communities—human, bird, fish and wildlife.



## The Economics of Water

In the development of the Great Lakes region, water was not just important; water was the single most important factor guiding settlement and establishing the economy.<sup>1</sup>

People have generated economic wealth in the Great Lakes region by exacting a high toll on its natural resources, including its water resources. All of the heavy water users in the Basin—residents, industry and agriculture—have been running up a water deficit for years.

The deficit in the Great Lakes water budget has developed in a number of ways. When a municipality expands beyond the carrying capacity of local water sources, it creates a water deficit. When industry, agriculture and residents pay less for their water than it costs to supply and treat the water, they are being given a subsidy that contributes to the overall water deficit. When governments undercharge for water, and do not spend revenues from water services on maintaining water infrastructure (pipes, sewage treatment plants, conservation technologies), they create an unbalanced water budget that future generations will have to pay for.

As the twentieth century draws to a close, water is increasingly being recognized as a valuable resource. The waters of the Great Lakes are looked at by other parts of the continent as a potential desirable

freshwater resource. This results in the waters of the Great Lakes increasingly being viewed as a commodity to be bought and sold.

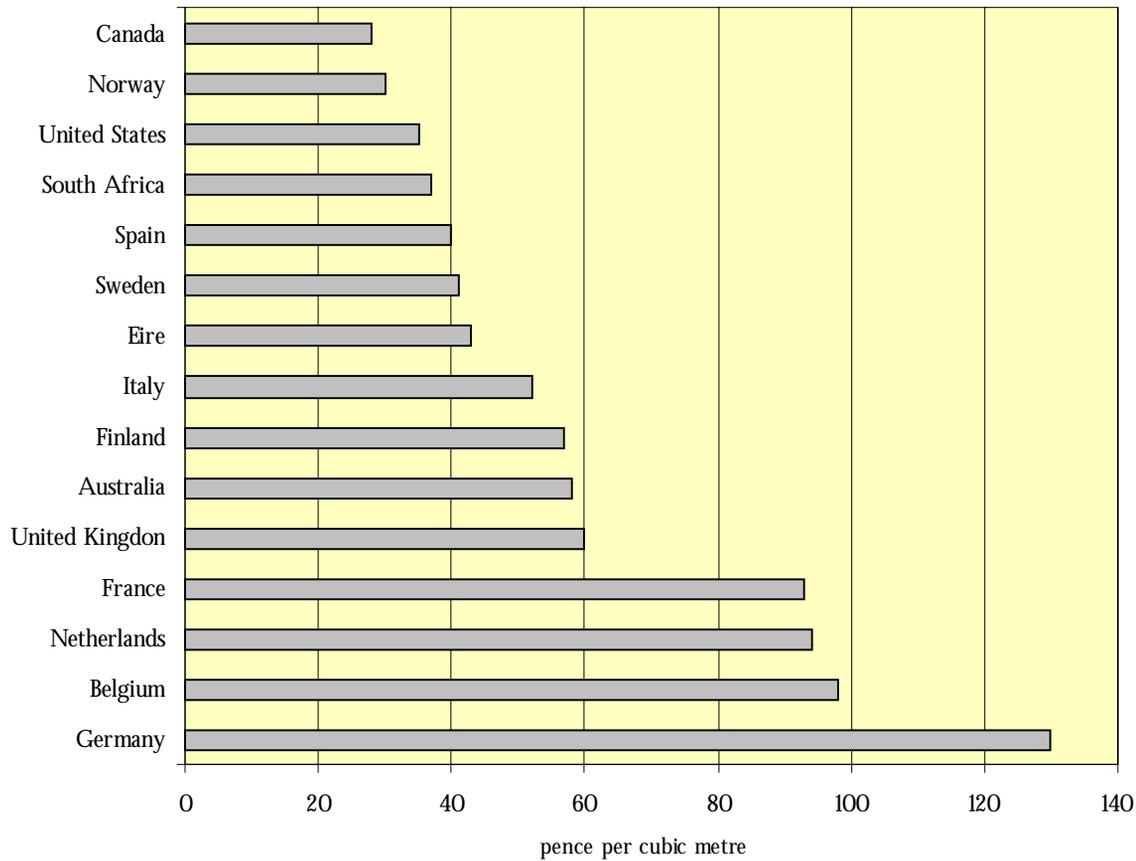
### THE PRICING OF WATER CONSUMPTION IN THE GREAT LAKES BASIN

Millions of dollars have been spent on water supply and treatment with little thought given to how efficiently existing water is used. Large projects have often led to increased energy use and environmental degradation, and added to the national debt and consumer spending.<sup>2</sup> Moreover, users have rarely paid the full cost of the water supplied to them.

Often, utility customers are not charged directly for the services they demand and, with subsidies in place, they do not pay the full cost of those services. Therefore, they have little incentive to economize in their use of water and wastewater services.<sup>3</sup>

Water is extremely cheap in Canada and the United States in comparison with other countries.<sup>4</sup> This commodity is cheap not only because of its ready availability in the Great Lakes region, but also because we undercharge for the use of water. An Ontario report noted that in 1990 user fees accounted for only 65 percent of expenditures on water infrastructure, and that these expenditures were only

## National Water Prices



\* Source: "National Utility Services and International Water Prices," *Water*, September 1995.

half of what would be required to maintain the system in the long run. The staggering cost of repairing existing infrastructure and of constructing new large water supply and treatment systems has convinced many governments that they can no longer afford to supply subsidized water.

Environment Canada has found a direct correlation between the price of water and the amount used. Low prices encourage high water consumption; increased cost of water creates an incentive to waste less. Households in Canada and the United States use twice as much water as European households but pay half as much for it. Environment Canada has also found that in Canada water use drops dramatically when residents are charged for the actual amount used rather than being charged on a flat rate basis regardless of how much water they use.<sup>5</sup>

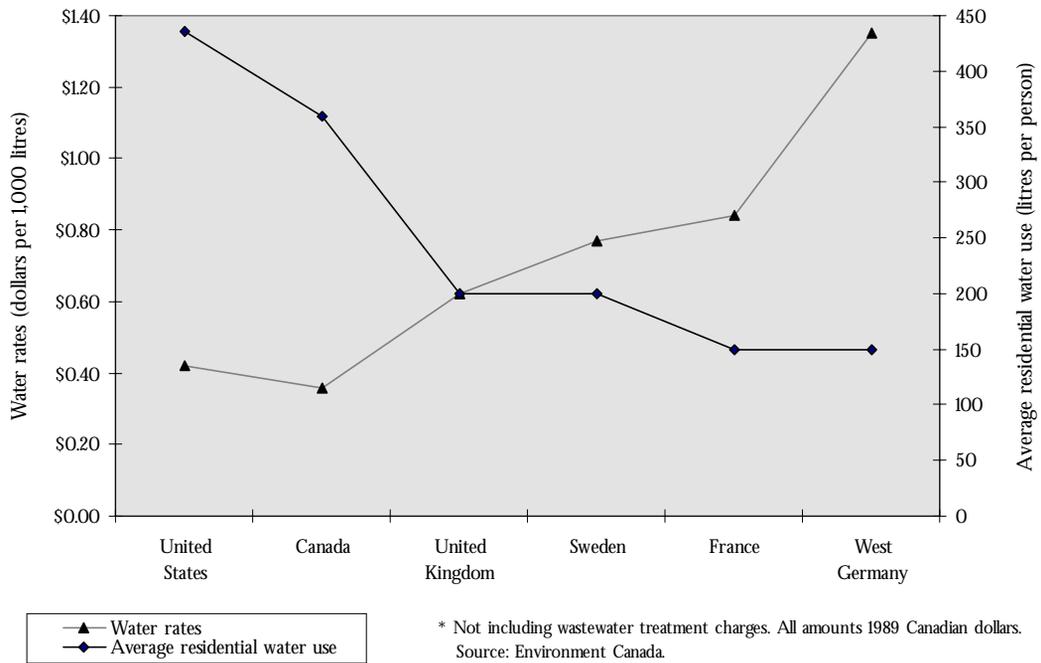
At present a number of different water rate

structures are in use within the Basin. These are:

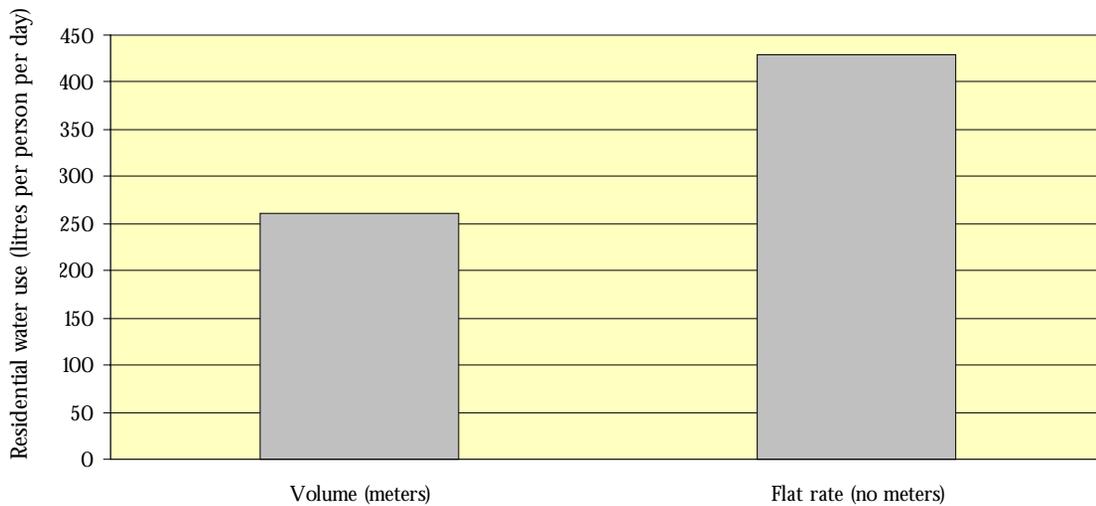
- *Flat rates*, where the user pays one price regardless of how much water they use; this is usually an unmetered system.
- *Constant block rates*, which charge for each unit used, charging the same rate for each unit used.
- *Declining block rates*, where consumers are given volume discounts by being charged lower rates as they use more water; this usually applies only to industrial operations.
- *Increasing block rates*, where the per unit price of water increases as the consumer uses greater quantities.

A declining block rate system discourages water conservation while an increasing block rate system encourages water conservation.

**National Water Rates and Residential Water Use, 1989\***



**Effect of Pricing Structure on Residential Water Use, Canada, 1991\***



\* Partially metred centres not included.

Source: Environment Canada, *Urban Water Environmental Indicator Bulletin*, February 1994

In Canada, approximately 37 percent of water users pay a flat rate, and 34 percent pay a decreasing rate as their use rises.<sup>6</sup>

A reasonable price for water would be one that reflects the cost of the services required to supply it and treat it after use in order to maintain it in the long-term for future generations. This is the *real cost* pricing system, sometimes called the *user pay* system.

Real cost pricing is not only an incentive to use water more efficiently; it also helps break the water-waste cycle that has driven water management for too long:

Because they are low, prices are rarely taken into account in projecting water demands. Many consultants and analysts assume a constant, or even increasing water use per capita, and then multiply these “coefficients” by projected population figures to generate future water “requirements.”

These requirements then become design parameters and lead to systems being expanded or built that would be too large if water prices were more reflective of actual resource values. Once these systems are built, they have to be used, which forms an incentive for keeping prices low, forcing another expansion of the system before it would be required if prices reflected actual economic conditions.<sup>7</sup>

Real cost pricing must apply to all types of users to encourage all users of water to maximize their efficiency in their use of water and to ensure that one user is not subsidizing another.

Assistance could be offered to some residential, agricultural and industrial sectors to help them make the transition to operations that use less water as we phase in real cost pricing. For example, farmers could be helped to move away from crops highly dependent on irrigation.

Concerns are sometimes raised about the application of real cost pricing for water to residential consumers whose budgets will be strained or broken by the resultant increases:

Access and affordability must be integrated into any efforts to make the country’s drinking water

and waterways clean and safe, so that low-income families, seniors, and individuals do not face the prospect of yet another crisis: the threat or actual loss of another basic necessity of life—drinking water—which the average American takes for granted.<sup>8</sup>

Water is a necessity of life that all should be assured access to, regardless of their wealth. Therefore, mechanisms must be put into place that ensure that the poor are not hurt by the added costs created when real cost pricing is instituted.

In England and Wales, where water prices doubled between 1989 and 1993, the number of times that people were cut off from their water for nonpayment of water bills increased from 480 to 21,282.<sup>9</sup> The British Medical Association is alarmed by the health effects on children in families forced to cut water usage to save money. Due to reduced hygiene, they see increased incidents of dysentery, hepatitis A, and clothing (body) lice.<sup>10</sup>

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**The British Medical Association is alarmed by the health effects on children in families forced to cut water usage to save money**

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**SAVING MONEY THROUGH CONSERVATION INSTEAD OF BUILDING INFRASTRUCTURE**

When combined with real cost pricing for water consumption, the extraordinary costs of new water projects are bound to contribute to the consideration of conservation alternatives.

The only motivation some cities need for conservation is a look at the money they put out to treat wastewater. In the mid-1980s, the sewage treatment plant in San Jose, California, was nearing capacity, and the city was faced with the prospect of building a new one at a cost of 180 million dollars. The city decided to pursue a different option.

Since less water used indoors translates into less wastewater released to the sewer system, the city initiated a large-scale program to reduce residential and industrial water use quickly. Officials hoped to delay the need for this huge capital investment and save the city and its residents money.<sup>11</sup>

The cost of mega-pipeline projects has also given water managers the incentive to consider alternatives when facing the depletion of local water resources. In the arid states of the U.S. southwest, there are many cases of local governments encouraging conservation

to protect water resources and save money. For example, water regulations in effect since March 1995 in Albuquerque, New Mexico, require private homes and businesses to have no more than 20 percent of the property landscaped for high water use.

This is just one of several initiatives across the Midwest and Southwest to promote *xeriscaping*—landscaping property with indigenous, drought-tolerant plant species. Albuquerque gave residents the incentive to support the new landscaping regulation by raising its water prices.

One neighbourhood recently installed xeriscaping after the neighbourhood associations' water bill averaged \$25,000 a year to irrigate twelve acres of grass. Preserving the city's water supply also saves the city money. Jean Witherspoon, the city water conservation manager, estimates that a 30 percent reduction in per capita water use would result in \$175 million in savings.<sup>12</sup>

## PRIVATIZATION OF WATER SUPPLY AND WASTE WATER SERVICES

Responsibility for water services in the Great Lakes is in transition to greater control over water systems by private companies.

Increasingly around the world, water services, once provided solely by government, are being privatized. For example, in 1989, governments sold their water supply and wastewater treatment facilities in England and Wales to private companies. In France, about 60 percent of the total population is served by privately owned water systems. Similarly in the United States, a growing number of municipalities are operating their water utilities as private operations.<sup>13</sup>

In 1994, Hamilton-Wentworth Region in Ontario put their sewage treatment plant under private management, while maintaining ownership of the plant.

Other Canadian municipalities currently considering plans for privately owned or managed water supply and treatment facilities include Montréal, York and Halton Regions. As of the end of 1996, the province of Ontario was planning to sell off the Ontario Clean Water Agency, the crown corporation providing water and sewage-treatment services for millions of people in Ontario; the Ontario Clean Water Agency is the largest holder of water plants in North America.<sup>14</sup>

From the public policy perspective, three main reasons are given for moving away from public ownership and operation of utilities:

- The belief that privatization will result in financially more efficient provision of these services. The presumption underlying this belief is that government-owned services are protected from the discipline of the market place.
- Under current debt burdens, governments are looking to divest themselves of services that they consider too expensive to maintain or expand. These include services in the Great Lakes such as the St. Lawrence Seaway, Ontario Hydro, and water supply and sewage treatment systems.
- The belief that the operator and the regulator should not be the same body, i.e., the government. Privatization “gets government and industry out of bed with each other and government can become an honest regulator.”<sup>15</sup>

The motive of private corporations is to increase profits. Private industry projects that the U.S. and Canadian market in privatizing sewage treatment plants could be worth more than \$150 billion.<sup>16</sup> They did not give an estimate for water supply systems.

Companies moving into the field include major firms like the British company Yorkshire Water PLC, the French company Lyonnaise Des Eaux-Demuz, Canada's Philip Environmental Inc. and SNC-Lavalin, and the U.S. firms Ogden Water Systems and Wheelabrator. Pipeline companies that move gas and oil also want into the field. They “believe it's the transport of water and sewage, more than the traditional shipment of oil and natural gas,” that will boost their profits and share prices.<sup>17</sup>

## PROBLEMS WITH PRIVATIZATION

### **Profit is not used for investment.**

The prime issue is that revenue made from sale of water services goes into the profits of the company rather than into the maintenance and rebuilding of infrastructure and investment in sound conservation technologies, education programmes and research.

The board of directors of a privatized water service corporation are answerable only to the shareholders, and decisions have to be justified on the basis of whether or not they are in the best interests of the shareholders. Shareholders' interests can be summarized in one word: profit. Decisions that increase shareholder dividends do not necessarily include matters such as maintenance of infrastructure, research or education or regard for environmental and ecosystem concerns.

Yorkshire Water PLC, a company that is seeking

business in North America, made the news in 1995 in Britain when it raised prices and cut services in response to drought conditions it had not adequately planned for. The corporation chose not to invest in infrastructure maintenance in 1995. It was losing 30 percent of its water to leaks, while making \$213.4 million in profits that year.<sup>18</sup>

Private companies are more inclined to use their income to make more investments. The private British water companies have been criticized for using revenue from sales of water to diversify their operations by buying power companies and garbage disposal operations and to expand their operations to other countries around the world.

### **Conservation is usually ignored.**

A company that makes its income through the sale of water or through the sale of water treatment services loses profits if water conservation increases. As a result, the company will only pay lip service to promoting water conservation.

### **Privatization does not mean better regulation.**

Governments in most parts of the Great Lakes are responding to industry complaints about regulation by reducing regulations and setting up voluntary or self-regulation programmes. Privatized services carefully controlled by hands-on government regulators will be accountable to the public; private companies cut loose to regulate themselves, subject only to the interests of their shareholders, may not be.

### **Privatization does not mean competition.**

One of the claimed benefits of privatizing water and energy services is that there will be competition and consumers will have the ability to choose their services from a number of suppliers. Privatizing of water services will not provide choices to consumers. Water services continue to be provided by a monopoly because it does not make economic or engineering sense to have a multiplicity of water distribution and collection pipes and of water and waste treatment plants.

### **The public remains at financial risk.**

Rarely does a private company take total responsibility for the provision of water and waste services. Usually, government is left with a major financial responsibility. The trend most frequently supported in privatization is a joint government–private sector arrangement. For example, Canada's National Round Table on the Environment and the Economy recommends that government "open the door to public-private

partnerships that will give municipalities a new source of financing and project management expertise."<sup>19</sup> The impact of these joint ventures is to leave government and taxpayers with the financial risks.

In 1994, the regional government of Hamilton-Wentworth made an arrangement with Philip Utilities Management Corp. (a new branch of Philip Environmental) to run the region's sewage treatment plant. Two years later, the chair of the Region's environmental services committee, who strongly promoted the deal, said, "I am not as supportive of it as I was originally."<sup>20</sup>

Major problems that have arisen include who has the responsibility when something goes wrong with the operation of the plant and who assumes losses and who gains from savings accrued. When 40 million gallons of sewage spilled into Hamilton Harbour from the sewage treatment plant, disputes arose between the municipal government and the private company over who was responsible.<sup>21</sup>

Experience in other sectors is also instructive. Alberta's provincial government co-owned a hazardous waste treatment and disposal plant with the private company Bovar Inc. The government had to guarantee Bovar minimum profit levels for the operation of the plant. In the first five years of operation, the province paid the private company \$250 million to support the company's profit level. Finally, in a desperate attempt to get this white elephant off its back the province paid Bovar \$147.5 million to take the province's 40 percent share in the operation.<sup>22</sup>

Ontario's provincial auditor warned that a toll road being built above Toronto leaves provincial taxpayers "on the hook if the highway does not cover its costs."<sup>23</sup> This is because the deal that has been made with the private consortium building and operating the road is not putting in any of the investment.

### **Broader policy issues are ignored.**

When utilities are privately owned or operated, public policy goals are shunted aside. Private sector control

is not about the public interest at all. It is about defending and institutionalizing the right of the economically powerful to do whatever best serves their immediate interests without public accountability for the consequences. It places power in institutions that are blind to issues of equity and environmental balance.<sup>24</sup>

Indeed, it can promote policies totally contrary to the broader public interest. Terrance Corcoran, a pro-business columnist for the Toronto *Globe and Mail*,

said that the privatization of water “can have a sinister side-effect, which is the creation of major new pressures for more government spending [on water works]. Government spending has always been a lucrative feeding ground for the private sector.”<sup>25</sup>

### **The public does not support privatization.**

Polls of Ontario public opinion show that the public is opposed to the privatization of water systems. When asked “Who should control water systems?” 76 percent said municipal officials, 19 percent said private agencies, and 6 percent gave no response.<sup>26</sup>

#### **THE BRITISH EXPERIENCE**

In 1989, the British government sold all water supply systems to private sector companies. Some of these companies are now getting involved in Great Lakes water supply systems.

Some of the main concerns of the critics of the experience since privatization include:

- Since 1989, these companies have been convicted of 237 serious pollution offences.<sup>27</sup>
- Maintenance of the water distribution system is so bad that water companies are pouring one billion pounds down the drain each year through leaks.<sup>28</sup>
- Yorkshire Water imposed bans on the use of hoses on 18 million householders, while it was responsible for leaking 30 percent of the water supply.
- North West Water imposed bans on watering gardens, while making 7.2 million pounds by selling off water reservoirs that could have supplied the needed water.<sup>29</sup>
- Incidents of water cutoffs of homeowners because of failure to pay bills increased from 480 before privatization to 21,282 in 1993.<sup>30</sup>
- Some water prices rose 77 percent after privatization. In the same period water company profits rose 70 percent.<sup>31</sup>

#### **GOVERNMENT AS BUSINESS**

Increasingly, governments are trying to operate in the same way as businesses do, operating as though their prime concern is to take care of their shareholders, i.e., the taxpayers, rather than the general public. This

means that the prime criterion used in decision-making is to provide service as cheaply as possible without giving serious weight to the social and environmental benefits that come from providing the service in another way. This means that differences between the way government and the private sector provide services lessen.

An example of this lessening of the differences shows up in water conservation. The Region of Waterloo, the largest municipality in the Great Lakes Basin dependent primarily on groundwater for its water source, has a very progressive water conservation programme. But the region’s supervisor of water efficiency points out that successful water conservation has a downside: “Reduced water use means less revenue for the area municipalities.”<sup>32</sup> As municipalities feel greater budget restraints, neither are they willing to lose this revenue from water consumption, nor are they willing to put the money into the water conservation programmes.

Henry Mintzberg, a professor of management at McGill University, notes the fallacy of this approach:

Many activities are in the public sector precisely because of measurement problems: If everything was so crystal clear and every benefit so easily attributable, those activities would have been in the private sector long ago.

The fact is that assessment of many of the most common activities in government requires soft judgment—something that hard measurement cannot provide. So when Management is allowed to take over, it drives everyone crazy. And no one more so than the “customer” who ends up getting the worst of it.<sup>33</sup>

#### **CONCLUSION**

To preserve the Great Lakes from the demands of the future, the challenge for the Great Lakes region is to enact a water conservation ethic at all levels and to assume scarcity in the midst of plenty. Economic instruments have a critical role to play in achieving this change. Water services should not be seen as businesses, whether privately owned and operated or whether owned and operated by government. The interests that must be taken into account when making decisions that affect water consumption must be much broader than those normally taken into account from a purely business perspective.

Water is not a commodity. It is a critical, life-giving necessity and component of the ecosystem.



## Trading Away the Lakes

The purpose of trade agreements is to break down barriers to trade that governments set up. Herman Daly, a senior economist in the environment department of the World Bank, says:

A more accurate name than the persuasive label “free trade”—because who can be opposed to freedom?—is “deregulated international commerce.”<sup>1</sup>

The Free Trade Agreement (FTA) between the United States and Canada and the North American Free Trade Agreement (NAFTA) between these countries and Mexico, which superseded it,<sup>2</sup> facilitate the flow of “goods” across international borders in North America. These agreements are reinforced by the worldwide General Agreement on Tariffs and Trade (GATT).

The vision of those who successfully promoted North America-wide free trade agreements is of a common market with the free flow of goods and resources. Free trade is an essential component of the privatization of the ability to profit from the sale of resources, for it involves the breaking down of barriers to where profits can be made. In this vision, water is another saleable commodity like wheat, lumber and copper, which will bring prosperity to those lucky enough to have an excess supply.

This grand vision is clearly stated by Francis Dale, president of Citizens for Water and Power for North America:

If North America is to continue to flourish and progress as a productive economic entity, made up of Canada, the United States, and Mexico—a virtual common market of North America—it is absolutely critical to consider the development of ever more cooperative and profitable uses for our fresh water resources in order to make possible the conservation and control of our natural supplies and the transfer of ever larger volumes of water from areas where there is surplus water to areas where it is desperately needed.<sup>3</sup>

Given the existing distribution of water and population in North America, it is likely that Mexico and the southwestern United States will be net importers of water, whereas exports are most likely to come from the Great Lakes Basin and other parts of Canada.

But many people have another vision—that of sustainability. In this vision, there is not an excess of water in one place and a scarcity in another. Instead water is in the place where it naturally belongs and people must learn to live within the limits and the

opportunities that it presents there. People with this vision see water diversion and export as contrary to sustainability. For example, one commentator has said,

Water diversion and export leads us in a direction precisely opposite to that implied by “sustainability.” Water diversion replaces natural systems with costly structures of a temporary nature, for the benefit of a restricted number of people, to meet a need that we have seen to be largely imaginary.<sup>4</sup>

## FREE TRADE AND WATER EXPORT

Water is a “good” in both NAFTA and the FTA. In both agreements, a “good” is that which is considered a “product” under the General Agreement on Tariffs and Trade (GATT).<sup>5</sup> The GATT tariff item for water is the following:

22.01 waters, including natural or artificial waters and aerated waters, not containing added sugar or other sweetening matter nor flavouring; ice and snow.

The official GATT explanatory note for this tariff heading states that it . . .

covers ordinary natural water of all kinds (other than sea water). Such water remains in this heading whether or not it is clarified or purified.

Under the GATT, products must be “gathered, stored, bottled or otherwise packaged or delivered”; as a result, bottled water or water carried by tankers would be a “product.” Further, since oil or gas in a pipeline are considered a product under GATT, it can be assumed that the same would hold true for water transferred in a pipeline.<sup>6\*</sup>

A number of consequences flow from water being a “good” under FTA and NAFTA.<sup>8</sup> The primary guiding principle in these trade agreements is that governments cannot act in ways that give economic advantage to their own people over people in other countries who wish to trade with them (the national treatment provision). This means that a country cannot use domestic measures such as taxes, laws and

regulations exclusively to benefit their own people.

While the FTA national treatment provision applies to both exports and imports, in adopting the GATT wording, the NAFTA provisions apply only to exports.<sup>9\*\*</sup>

In NAFTA, however, the national treatment principle is extended to investment and services and thus the provision of construction, engineering services, and investment, all of which are key to any large-scale water export development scheme, could not be impeded by a domestic government.<sup>10</sup>

In addition, both the FTA and NAFTA prevent a country from applying export taxes or restrictions on quantities exported unless similar taxes or restrictions are applied to domestic consumption. Based on a GATT provision, quantitative restrictions on exports are only permitted if there is a critical shortage of foodstuffs or other essentials, the restriction is necessary to protect human, animal or plant life or health, the restriction is necessary to conserve an unrenovable natural resource, or where there is an emergency situation.<sup>11</sup>

For these provisions that allow a restriction on export to come into play, the country making the restriction would have to be experiencing a major water shortage crisis. Even if this dire situation developed, the exporting country would have to cut domestic consumption by the same proportion as the exports are cut, the price paid in both countries would have to be equal, and under no circumstances could the “normal channel of supply” of a good be restricted.

As a result, FTA and NAFTA severely constrain regulations on water export, if not making them virtually impossible.

## IMPLICATIONS FOR CONTROL OF DIVERSIONS AND WATER CONSERVATION IN THE GREAT LAKES

The development of free trade in water has serious implications for attempts to prevent diversions from the Great Lakes and, as a result, for Great Lakes water levels. The premiers and governors through the Great Lakes Charter and the IJC under its powers in the Boundary Waters Treaty may attempt to control the export of water from the Great Lakes Basin. But the extent to which they can use these powers are now challengeable under NAFTA because their actions

\* Answering assertions that water is a “good” in the FTA and NAFTA, the Canadian government noted that the implementing legislation for both agreements did not apply to water. However, if the issue of water exports went to a trade dispute panel, the international treaty clause would have precedence over domestic legislation.<sup>7</sup>

\*\* There is some uncertainty as to whether NAFTA may apply to exports. Annex 30L3 excludes the exports of raw logs and unprocessed fish, suggesting that exports are excluded. According to this argument, if NAFTA does not extend to exports, Mexico will not have the security of access to Canadian water, which the United States does have under FTA.

would favour their own residents to the disadvantage of people outside the Great Lakes Basin.

Under the Great Lakes Charter, one of the criteria that governments are supposed to consider when deciding on a request to divert water out of the Basin is whether the jurisdiction receiving the water has a serious water conservation programme. It is doubtful that this provision can be used under NAFTA.

The national treatment provisions in the trade agreements will discourage efficient uses of water in the Great Lakes. Under NAFTA and the FTA no party can impose a tax or duty on another party that it does not impose on itself. This will force domestic and export consumers to pay the same price for water.

Because Canadians and Americans do not pay the full cost of water, any trade from the Great Lakes Basin would subsidize the cost of water for the export consumer. Thus, until the full cost of water is charged to domestic consumers, the water will be a good deal for those who are importing it and will encourage wasteful usage.

Despite the fact that areas likely to import water would probably be facing a shortage of their own water resources, they will have little incentive to conserve.<sup>12</sup> Why should they conserve if they do not have to rely on their local resources and can obtain cheap water from elsewhere? Those who have wasted their own water resources can continue such practices with water from distant ecosystems.

Given the important limitations on what types of regulations are permissible under free trade, government conservation programmes will be more difficult to achieve. If a government were to subsidize industry in order to promote water conservation, this could be seen as an unfair trade advantage and could be challenged by foreign competitors. If a country tried to use a policy such as domestic taxes or higher

water prices to encourage conservation, foreign competitors would be at a competitive advantage and thus domestic producers would be upset. The threat of a challenge under trade agreements may well be enough to discourage governments from even trying to proceed with such programmes.<sup>13</sup>

Under NAFTA, when water is exported, the proportion of the total water output available for export must be maintained at a relatively constant rate. As a result, even if export customers had blatantly wasteful water usage, there is little that an exporting country could do to discourage

this behaviour because any attempts by the exporting country to limit exports must be met by a proportional decrease in domestic consumption.

Once a NAFTA country allows a domestic corporation to divert water and deliver it elsewhere as a commodity, it must allow foreign corporations from other NAFTA countries to do the same. Thus, for example, if Canada allowed a Canadian firm to divert water from the Great Lakes, it would also be required to allow U.S. or Mexican firms to do the same.<sup>14</sup>

## DEALING WITH FREE TRADE

If the residents of the Great Lakes Basin are to have any hope of protecting the waters of the Great Lakes under free trade, it is essential that they quickly develop and implement a powerful, effective water conservation program that is uniform throughout the Great Lakes. Only in this way could they hope to withstand a challenge under the free trade agreements if they try to impose restrictions on exports of water. Even then it may be difficult.

In addition, it is essential to prevent the export of water from the Great Lakes Basin because, under free trade, once we turn the tap on, we cannot turn it off

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**Once we turn  
the tap on,  
we cannot turn it off**

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## The Warming Warning: Climate Change

### SUMMER '95—ONE FOR THE RECORD BOOKS

By June 21, 1995, the first official day of summer, Canadians already had a taste of what would become a record-breaking season. In Alberta, the north was on fire and the south was under water. Plow winds, mini-tornadoes and hail swept through many prairie towns. Heat and humidity gripped the East, and three times the usual number of icebergs drifted south of St. John's. Following two record winters, one the coldest in seventy years and one among the mildest this century, many Canadians are asking: Is something strange happening to the weather?<sup>1</sup>

There is little doubt that something strange is happening to the weather in Canada, the United States and everywhere else. Droughts, floods, storms and other extreme forms of weather have increased in number and intensity worldwide. These disruptions in weather patterns are evidence of global climate change or global warming, as many people call it.

World experts have concluded that these changes are happening because "humanity is conducting an unintended, uncontrollable, globally pervasive experiment whose ultimate consequences could be second only to a global nuclear war."<sup>2</sup>

### THE CHANGING WEATHER

In late 1995, the consensus of the United Nation's Intergovernmental Panel on Climate Change (IPCC), a group of 2,500 scientists, was that human activities are contributing to the strange weather we are seeing. They concluded that there is "a discernible human influence on global climate and that this influence represents an important additional stress on the global ecosystem."<sup>3</sup>

Greenhouse gases such as CO<sub>2</sub>, methane and water vapour act in the earth's atmosphere like the panes of glass in a greenhouse. They allow the sun's radiant heat to pass through the atmosphere to the earth, but prevent it from entirely reflecting back out into space. This process allows the earth's temperature to be approximately 33° C (55° F) warmer than it would otherwise be, and is the reason why life survives on this planet.

But human activities are resulting in increased releases of greenhouse gases to the atmosphere. There is 25 percent more CO<sub>2</sub> in the atmosphere now than there was one hundred years ago, as well as higher concentrations of methane and nitrous oxide. In addition, substances such as chlorofluorocarbons, which were never in the earth's atmosphere before, are being released by humans; many of these are

enormously potent greenhouse gases. It is estimated that “the world will likely face a rate of [climate] change in the next several decades that exceeds ‘natural’ rates by a factor of ten.”<sup>4</sup>

The major measurable effect of the presence of all of these gases in the earth’s atmosphere is higher temperatures. Global temperatures have increased between 0.3°C and 0.6°C (0.5° and 1.0° F) since the late nineteenth century. But this averaging masks regional differences. In Canada, over the same period, temperatures have increased on average 1.1°C (1.8° F), with the greatest increases occurring in winter and at night. Environment Canada scientists predict winter temperatures in the Great Lakes area could rise by as much as 9°C (15° F) if CO<sub>2</sub> concentrations double.<sup>5</sup> The IPCC estimated in 1995 that global temperatures will rise between 1° and 3.5° C (1.7° to 5.8° F) between 1990 and 2100 unless there is a dramatic change in human activities that release greenhouse gases.<sup>6</sup>

Such seemingly small temperature changes mean major differences in the world’s climate. Scientists estimate that global temperatures were only 3° to 5° C (5° to 8.4° F) colder during the last ice age than they now are.<sup>7</sup>

The changes that this temperature increase are and will create include:

- More storms, created by the increased energy in the atmosphere. According to the Worldwatch Institute, in the past five years, the world has had “unprecedented damage from weather related disasters.”<sup>8</sup> The worldwide insurance industry is carefully tracking these trends because they are alarmed at the insurance payments they are having to make. They state that in the past six years insured losses from storms worldwide have tripled.<sup>9</sup>
- More forest fires caused by lightening from storms and by the tinder box condition of the forests because of the dryness. Under these conditions, fires are more frequent, more intense and more severe. Sheila Copps, Canada’s former minister of the environment, concluded that “fire is transforming many of our forests into grasslands—permanently.”<sup>10</sup> A vicious cycle is set up. When forests burn, they release carbon in the form of CO<sub>2</sub>. High levels of CO<sub>2</sub> in the atmosphere mean higher temperatures, more lightning storms and drier forests, which means more forest fires.
- Changes in water levels. In some areas water levels will rise as a result of global warming. The IPCC estimates that the sea level will rise by 15 to 95 centimetres (6 to 36 inches) between now and

2100 because of the melting of the polar ice caps.<sup>11</sup> At the same time, the levels of most freshwater bodies will drop because of evaporation and reduced recharge from depleted rivers.

## CLIMATE CHANGE AND THE GREAT LAKES

Many studies have been undertaken to predict the effects of climate change on the Great Lakes–St. Lawrence River Basin.<sup>12</sup> Most are based on the assumption that CO<sub>2</sub> concentrations will double by the year 2100. These studies present a picture of conditions in the Great Lakes in the year 2100.

### Temperatures increase

In winter the atmospheric temperature will be 3.4° to 9.1° C higher (5.6° to 15° F). In summer the temperature will be 2.7° to 8.6° C higher (4.5° to 14° F).<sup>13</sup>

### Lake levels decrease

Great Lakes water levels will decrease due to increased evapotranspiration because of the higher temperatures and decreased runoff. Runoff to the Great Lakes will decrease by 23 to 51 percent.<sup>14</sup> Overall the Great Lakes will drop by a half metre to one metre (1.6 to 3.3 feet).<sup>15</sup> The decrease will vary by location. For example, Lake Michigan water levels may drop by 1.25 to 2.5 metres (4 to 8 feet).<sup>16</sup> Water levels in the freshwater portion of the St. Lawrence River will decrease by one metre (3.3 feet).<sup>17</sup> Engineered control structures will not be able to mitigate these changes in a scenario where water levels are permanently lowered.

### Reduced wetlands

Inland wetlands will be particularly vulnerable to climate change.<sup>18</sup> They will dry out and fill in with grasses. This loss of habitat will affect every species reliant on the wetland food web: aquatic and hydrophilic plants, frogs, salamanders, butterflies, turtles, species higher on the food chain such as waterfowl, hawks, herons, shrikes and mammals such as river otters and foxes. If habitat loss becomes critical enough, many of these species will disappear forever from the Great Lakes region.

### Loss of forests

Climate change will have the greatest impact on high-latitude forests, such as the forests along the northern rim of the Great Lakes Basin. The IPCC has stated that the whole composition of northern forests could

change and that the boreal forest could disappear from the Great Lakes.<sup>19</sup>

The IPCC also notes that, while changes in soil moisture and mean temperature will change the species distribution within forests, the greatest change to boreal ecosystems will arise from frequent and intense fires, and the ravages of pests and pathogens whose range will be greatly increased because of climate change.<sup>20</sup>

### **Loss of cold water fish**

Warmer water temperatures will change the incidence and distribution of fish species. Cool water fish species could disappear and give way to up to twenty-seven new, warm water species. Spawning will be affected by warmer water temperatures, reduced stream flow and poorer water quality.<sup>21</sup>

### **Decreased water quality**

Less water in the lakes will mean higher concentrations of the contaminants that human beings have been dumping into them for more than a hundred years. Less water in the Basin generally, including less groundwater, will mean increased concentrations of contaminants currently being put into groundwater and surface water, such as agricultural fertilizers and pesticides, manure, the effluent from sewage treatment plants and the outflow from failing septic tanks.

Warmer, dirtier water will provide an environment for parasites and bacteria. The third outbreak in the Great Lakes region since 1993 of the parasite cryptosporidium in March 1996 indicates that systems are not adequate to deal with problems we face now.\*

Lower lake levels caused by climate change will require increased dredging. Contaminants that have settled over decades on the lake bed will be disturbed.

Higher sea levels and lower freshwater levels in the Great Lakes Basin will permit the further encroachment inland of salty ocean waters from the Atlantic Ocean into the St. Lawrence River.

### **Increased human health problems<sup>22</sup>**

Less water will mean dirtier, more contaminated water, which will have a negative effect on human health. Higher temperatures in the summer, as they did in the summer of 1995 in Chicago, New York and Toronto, will cause hundreds of heat-related deaths. Heat and

humidity combined with ground-level ozone, smog and aerosols will cause increased respiratory illnesses and asthma.

Climate change will bring illnesses to the Great Lakes that the region has never experienced before.

Higher temperatures will extend the range of disease-carrying insects. Mosquitoes that carry such diseases as malaria, yellow fever, dengue fever and encephalitis will extend their range north and move to higher elevations. The IPCC predicts that malaria could become a health risk, even above the 49th parallel.<sup>23</sup>

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## **Malaria could become a health risk, even above the 49th parallel**

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### **Increased crop damage**

Weather-related crop damage and losses will rise because of climate change. There will be more precipitation in the winter, less in summer; spring thaws will occur sooner, and more violent wind and hail storms will occur during the summer. All of these changes will require modifications to farming practices, and will increase the demand for water for growing during the summer months—at the same time that water levels in the lakes and their tributaries are decreasing.

### **Decreased shipping**

Ships will have to carry less cargo in order to navigate in shallower waters, which will increase shipping costs approximately 30 percent.<sup>24</sup> More dredging will be needed, further increasing the costs of shipping.

### **More costs for industries dependent on water**

The easy access to water that has attracted industries such as breweries, the chemical industry, etc., will be decreased. Hydropower generation will be decreased, with an average yearly loss of \$1.5 billion.<sup>25</sup>

### **Benefits**

Along with these negative effects, climate change will bring some benefits that some people may find appealing. These include longer growing seasons and more ice-free days on the lakes and the St. Lawrence Seaway. But experts conclude that the rate of change will be so rapid that no country in the world will benefit.<sup>26</sup>

In addition, these benefits are almost always calculated in terms of benefits to human beings, and almost always in terms of economic benefits. A better

\* The March 1996 outbreak occurred at Collingwood, Ontario. There have also been outbreaks in Kitchener, Ontario (about 150 people infected), and in Milwaukee, Wisconsin (400,000 infected, 100 of whom died).

calculation would acknowledge the immense cost to non-human residents of the Great Lakes Basin, and the loss we all suffer when human action and inaction result in the loss of biodiversity in the Basin and the extinction of species.

The fish, birds and animals in the Great Lakes Basin are less able to rapidly adapt to the major changes that climate change will bring than are humans, and they will suffer accordingly.

### PRESSURES FROM OUTSIDE THE GREAT LAKES

Climate change is happening all around the globe. This means that all parts of the world will experience declining water resources. Even with falling water levels in the Great Lakes, this region will still be relatively water rich.

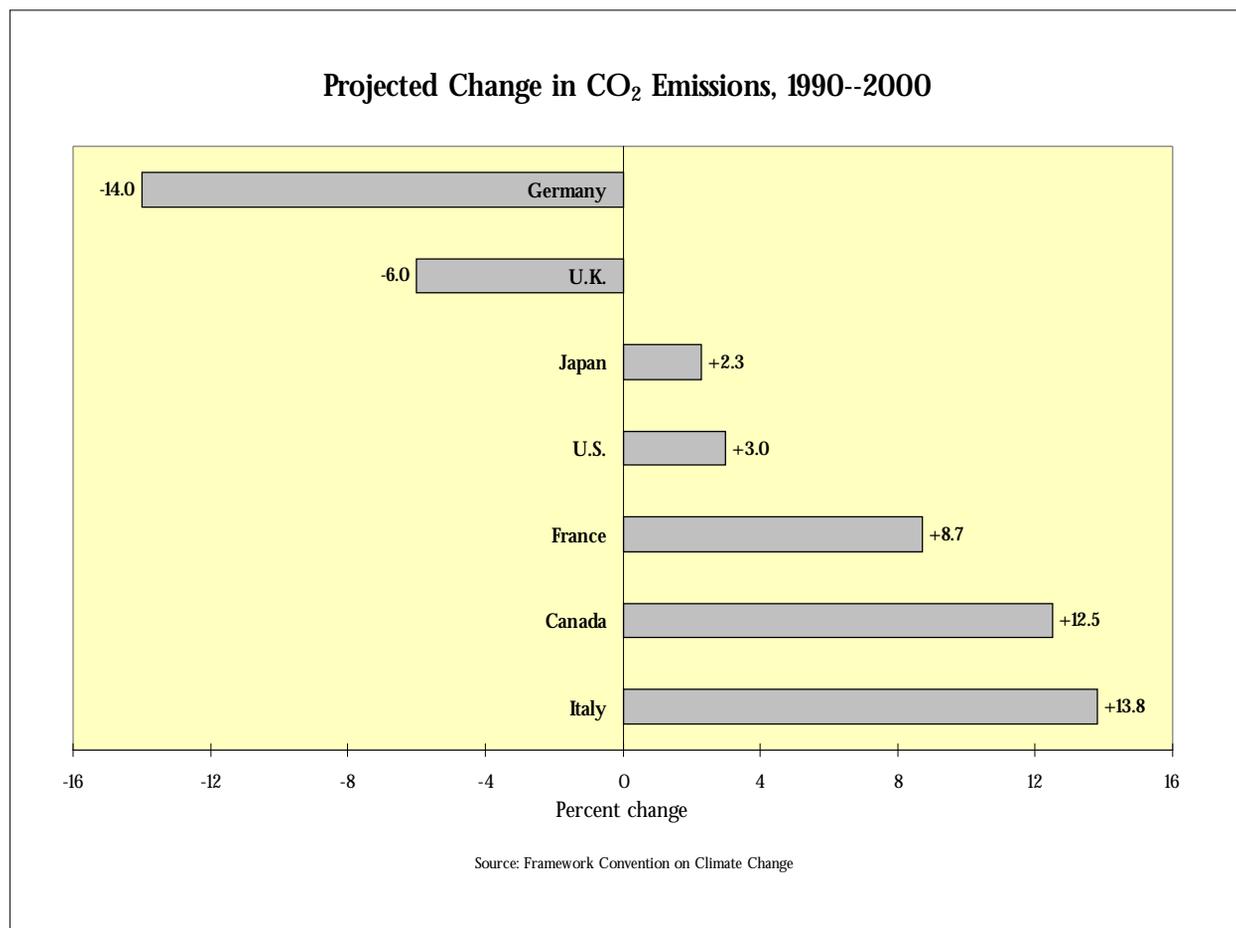
This means that the increasingly parched areas of the North American continent will look ever more covetously at the waters of the Great Lakes. Water diversion schemes that have been dropped in the past

because of their great expense will no longer look so unreasonable. And the diversion schemes will grow ever more grand. No pipeline scheme will appear too unrealistic and expensive if it is the only hope left.

The chain of events that will lead to increased diversions out of the Great Lakes has been described as follows:

Because of the gradual nature of climate change, people will continue to expect water to be readily available and will begin to look to areas that are water rich (such as the Great Lakes) as droughts continue. The perception and expectation that plenty of water will be available will be difficult to overcome with such a large potential source of fresh water and the technology to distribute water over long distances. The Great Lakes will be at risk.<sup>30</sup>

The United Nations estimates that there are ten million environmental refugees on the planet today—people who have left their homes because the local



environment has declined so badly that it can no longer provide them with the means to live. Many others, though not in such desperate plight, also move to areas that are perceived as wealthy enough to increase their standard of living. Climate change will increase the number of people who will leave their homes to seek greener pastures.

The Great Lakes will probably become one of the prime destinations for such people. Inhabitants of the southwest United States and many other parts of the world will probably move into the Great Lakes Basin to enjoy the relative luxury of water. It could result in millions of new residents in the Great Lakes Basin.<sup>27</sup>

## RESPONDING TO CLIMATE CHANGE

In 1992, Canada and the United States, along with approximately 130 other countries, signed the United Nations Framework Convention on Climate Change. By signing this convention, these countries committed themselves to reduce their CO<sub>2</sub> and other greenhouse gas emissions to 1990 levels by the year 2000.

Some people have criticized the convention target of achieving 1990 emission levels by 2000 as being too low to forestall the effects of climate change. But even these goals are not being met by Canada and the United States and most of the other countries that signed the Climate Change Convention—primarily because the implementation programmes are purely voluntary in nature. In March 1996, the U.N. secretary for the implementation of the convention concluded that, rather than stabilizing their emissions, “most industrial countries are heading in the opposite direction.” If you add to that the dramatic increases in release of CO<sub>2</sub> from countries that are now industrializing, the picture becomes even more bleak.<sup>28</sup>

Rather than trying to lessen the effect that human activities are having on the climate, governments are expending significant resources trying to find ways to adapt to climate change. They appear to have accepted the inevitability of dramatic climate change and are now looking for ways to survive it.

But this is not a solution. Inevitably, the adaptation methods will leave out the poorer in our own and

other countries. And the adaptations ignore the birds, animals and fish that live on the planet.

In order to reduce greenhouse gases, we must, and can with existing technologies, dramatically “improve energy efficiency in the transportation, building and industrial sectors and increase the use of renewable energy in the electricity sector.”<sup>29</sup> Not only will this help prevent one of the major future threats to sustainable water levels in the Great Lakes by reducing climate change, but will also immediately contribute to reducing the use of water and the disruption of flows caused by the ways we now produce electric power.

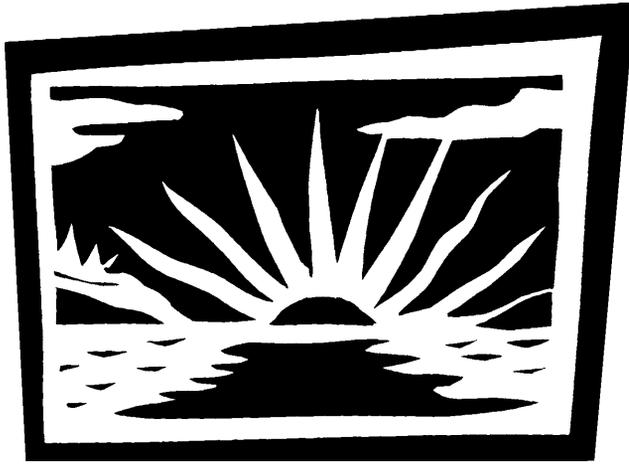
## THE DILEMMA

Climate change is not a speculative issue. It is a reality. We are seeing the effects now. This does not mean, however, that the extent of the changes described here is inevitable. If we take serious action to dramatically reduce emissions of greenhouse gases from human activities, the extent of the change can be reduced.

Nevertheless, as climate change occurs, we in the Great Lakes will be confronted by some major decisions about the greater demands that will be made within the Great Lakes Basin and from outside of the Great Lakes Basin for access to the waters of the Great Lakes.

Current policies and laws are not sufficient to forestall the threat of water shortages in the Great Lakes region or to successfully defend against demands on Great Lakes waters from other regions. We must now start the lengthy and complicated negotiation process to develop a basinwide sustainable water strategy.

In developing this strategy, the most difficult dilemmas that the residents of the Great Lakes will be faced with are ethical ones. In a world of increasingly scarce water supplies, how can we deny access to the waters in this region to those who are in desperate need for water? How do we balance the needs of human beings with those of the fish, birds and animals for whom the Great Lakes Basin is also their home?



## Sustaining the Great Lakes

We can no longer take for granted the copious waters of the Great Lakes that flow around us. Population growth, continental water depletion, climate change, the loss of regional control over decisions affecting the waters of the Great Lakes, and our wasteful water use practices are building to a crisis early in the next millennium.

Individually, each withdrawal of water from the Great Lakes seems insignificant. When these withdrawals are combined with each other, and when the additional stresses that the next century appears to be bringing are taken into account, the quantities of water in the Great Lakes will be dramatically affected. Therefore, we must take serious action now.

Estimates show that, if we continue at projected growth and water use trends, forty years from now (in 2035) we will be withdrawing twice as much water from the Great Lakes as will be flowing out of the Great Lakes system into the St. Lawrence River. The flow into the St. Lawrence River will have been reduced by a quarter.<sup>1</sup> These estimates also show that losses of water because of human consumption will be almost four times as high as now.

To this loss must be added the projected losses of water because of global warming. If current trends in climate change continue, by 2035 losses of water because of global warming are projected to be twice as high as the loss of waters due to human

consumption.<sup>2</sup>

These estimates do not take into account waters that may be lost from the Great Lakes ecosystem if pressure from outside of the Basin is successful at diverting the lakes' waters to other parts of the continent.

If we allow these changes to occur, the Great Lakes will be a very different place from the home that we now live in. Our health, our cultures and our economies will all be substantially changed. The impacts on the fish, birds and wildlife will be even more dramatic.

Unfortunately, we are ill-prepared to tackle these problems. We lack a coordinated basinwide strategy to protect the waters of the Great Lakes from being drained and disrupted. The one such effort in that direction—the Great Lakes Charter—has not been successfully implemented. While Great Lakes jurisdictions pay lip service to cooperative ecosystem approaches, each jurisdiction still acts in its own short-term selfish interest.

Over the past decade our ability to make decisions that prevent the misuse of the waters of the Great Lakes has been weakened by the free trade agreements and by the growing trend to privatization of public services.

Our lack of coordinated ecosystem activity on water quantity issues stands in stark contrast with the

preventive efforts that we in the Great Lakes have dedicated to water quality issues. The alarming problems with the health of the birds, wildlife, fish and people in the Great Lakes Basin because of persistent toxic substances show that we still have a long way to go to protect the Great Lakes from these toxic intruders. Nevertheless, our successes in the water quality field give us two valuable lessons:

- We must address our problems through coordinated Great Lakes wide problem definition, assessment, decision-making and implementation, and share these plans with other regions.
- The driving force behind protecting the Great Lakes is the passion, wisdom and determination of the citizen's groups, a force that becomes even more powerful when it becomes a basinwide movement.

#### PRINCIPLES FOR AN ACTION AGENDA

The bases on which we make decisions about the acceptability of actions that affect water levels and the lakes' natural flows and fluctuations must be changed. We must:

- Give more weight to protecting all parts of the ecosystem, including fish, wildlife, birds, and wetlands.
- Recognize the negative effects that changes to the levels and flows of the waters of the Great Lakes ecosystem have on the spiritual, cultural and physical health of the aboriginal peoples living in the Great Lakes Basin. We must ensure that the First Nations and Tribes have the opportunity to control decisions around water levels and flows that can have negative effects on them. We must also ensure that we learn from their wisdom.
- Recognize that we are outrageous wasters of water and dramatically reduce our water consumption.
- Base our land use and development decisions on the principle of living within the capacity of the water resources naturally available within the watershed where we live.
- Recognize that many of our water quality problems will be compounded if we do not prevent the further depletion of water volumes in the Great Lakes. We must take into account the interconnections between water quantity and water quality problems when making decisions.

#### A SUSTAINABLE GREAT LAKES WATER STRATEGY

We need to develop a basinwide Sustainable Great Lakes Water Strategy. Each government should adopt the strategy in a way that makes it legally binding, and change their laws, regulations and programmes to ensure that the strategy is carried out. The strategy should be developed and implemented with the full involvement of the public. A special emphasis should be placed on including the First Nations and Tribes, and municipalities in the development of this strategy.

The strategy should be based on the principles listed above and should contain the following components:

- A goal for the reduction of all human use of water by 50 percent per capita in the Basin by 2005.
- A water conservation strategy. One aspect of this strategy should be water efficiency codes for all domestic, agricultural, commercial and industrial appliances and machinery. Another aspect of this strategy should be economic instruments that promote water conservation such as true cost pricing.
- An assessment of the impacts of agriculture, the power industry and the mining industry on water flows and levels and a policy on how to minimize these impacts.
- An assessment of the possible demands from outside of the Great Lakes Basin for water from the Great Lakes and a strategy for addressing these demands.
- An assessment of the impacts that privatization of water systems can have on the objectives of the strategy and on the basis of this assessment, a policy on privatization of water systems.
- An evaluation of the impacts of international trade agreements on the efforts of governments in the Great Lakes Basin to protect water resources in the Great Lakes and a strategy for addressing this.
- An assessment of the possible effects of climate change on the waters in the Great Lakes and a strategy for implementing aggressive measures to reduce the human activities that are creating climate change.
- Guidelines for each jurisdiction on how to develop a sustainable waters plan within their jurisdiction that meshes with the basinwide plan.
- Guidelines for the development of watershed management plans for each watershed that mesh with the jurisdiction-wide plan.

- A requirement that communities implement land use and economic planning on the basis of living within the water supplies available in their watershed rather than importing water from outside the watershed.
- A framework for informing and involving the public in the development and implementation of all strategies and decisions that affect water quantities and levels and flows.
- A communications and consultation plan to ensure dialogue between the Great Lakes community and our neighbours throughout the continent. The purpose of this plan is to take leadership in establishing sustainable water strategies throughout the continent.

amended to make sure that it is consistent with the strategy.

The Great Lakes Charter should be amended to:

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**Concerned  
citizens' groups  
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with in the development  
of this strategy**

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- Lower the trigger level for consideration of diversions and consumptive uses from 19 million to 3.8 million litres (five million to one million gallons) per day.
- Include the First Nations and Tribes, the IJC and the federal governments as parties to the charter with the same responsibilities and powers as the states and provinces.
- Require that all parties to the charter approve of diversions and consumptive uses before they can be carried out.
- Ensure that any changes to the Chicago diversion are subject to the provisions of the charter.

The appropriate body to coordinate the development of this strategy appears to be the International Joint Commission. It has already carried out considerable valuable work in this field; it operates basinwide and has the respect of the broad spectrum of concerned interests. The Canadian and U.S. governments should give the IJC a special reference to develop this strategy. The governments should ensure that the IJC is given enough funding to carry out this task, so that addressing water quantity issues does not interfere with the IJC's ability to address water quality issues.

The Commission for Environmental Cooperation, set up under the free trade agreement between Canada, Mexico and the United States, should be involved in the development of the Sustainable Great Lakes Water Strategy. Concerned citizens' groups outside of the Great Lakes Basin should also be consulted with in the development of this strategy.

#### **THE GREAT LAKES CHARTER**

The governments and the IJC, in full consultation with the public, should assess the effectiveness of the Great Lakes Charter and determine the appropriate relationship between the Sustainable Great Lakes Strategy and the charter. The charter should be

- Change the database provisions to ensure that:
  - \* The summary reports are issued within six months of the end of the year.
  - \* The same data is gathered in each jurisdiction.
  - \* A mechanism is in place to track the cumulative amounts of small withdrawals.
- Ensure that legislation, regulations and programmes within each jurisdiction are consistent with the charter and include measures to implement the charter and develop a water conservation strategy for each jurisdiction.
- Ensure that mechanisms are in place to automatically involve the public in decisions made under the provisions of the charter.

#### **THE INTERNATIONAL JOINT COMMISSION**

The IJC should assess the way that it carries out its role under the Boundary Waters Treaty to approve diversions, and approve and control the operation of control structures in the boundary waters of the Great Lakes.

The IJC should ensure that decisions it makes on approving diversions and approving and controlling the functioning of control structures take into account basinwide and long-term needs.

The IJC should ensure that it fully involves the

public in reviewing applications for approval of control structures and diversions and in the implementation of control orders.

## **NEXT STEPS**

Many citizens' groups are currently working hard to address these issues in their communities. Some are fighting diversion proposals; others are fighting proposals for additional or expanded uses of water; some are fighting expanded privatization of public works; others are pushing for the implementation of water conservation in their communities.

In order to satisfactorily deal with these local struggles, which are likely to increase in number given current trends, we must start working as a Great Lakes wide community to get to the root causes of these problems. We have proposed some directions for

doing so. We look forward to working with people throughout the Great Lakes to address these issues.

We also must recognize that the Great Lakes cannot be separated from the rest of the North American continent. Therefore, it is essential that we work with citizens' groups concerned about these issues in all other parts of the continent.

If we are to satisfactorily address the issues raised in this report, we must change our attitudes. We must recognize that water is not just a resource and a commodity to be wasted or preserved, to be bought or sold.

The waters of the Great Lakes are the vital lifeblood of the Great Lakes Basin that bring life to all its inhabitants. These waters are also a spiritual force that bring added meaning to our lives. We must enjoy them, respect them, and live in harmony with them and all their other residents as responsible members of this amazing community.



## Glossary

### **Water consumption**

That portion of water withdrawn or withheld from the Great Lakes and assumed to be lost or otherwise not returned to the Great Lakes Basin due to evaporation, incorporation into products or other processes.

### **Water used**

Same meaning as water withdrawal.

### **Water withdrawal**

Water removed from the ground or diverted from a surface water source for use.

### **Water measurements**

bld—billion litres per day

bgd—billion gallons per day

gpd—gallons per day

lpd—litres per day

mld—million litres per day

mgd—million gallons per day



# Endnotes

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