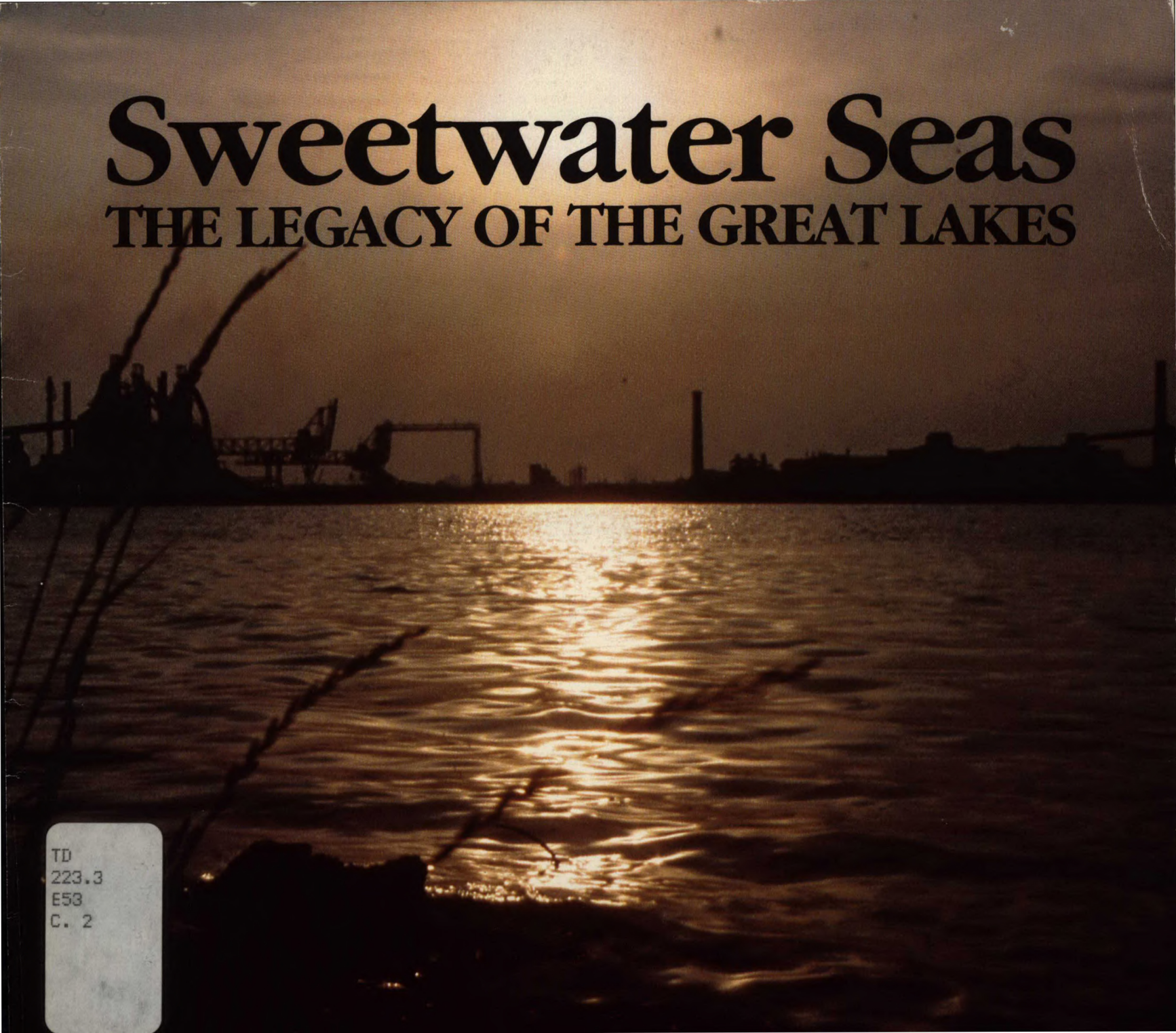
Sweetwater Seas

THE LEGACY OF THE GREAT LAKES



In the 1600s, the early French missionaries were astounded when they first caught sight of the Great Lakes. The Jesuits had never seen such huge bodies of fresh water. In an account of their journeys, Father Gabriel Sagard refers to the vast inland lakes as the "sweetwater seas".

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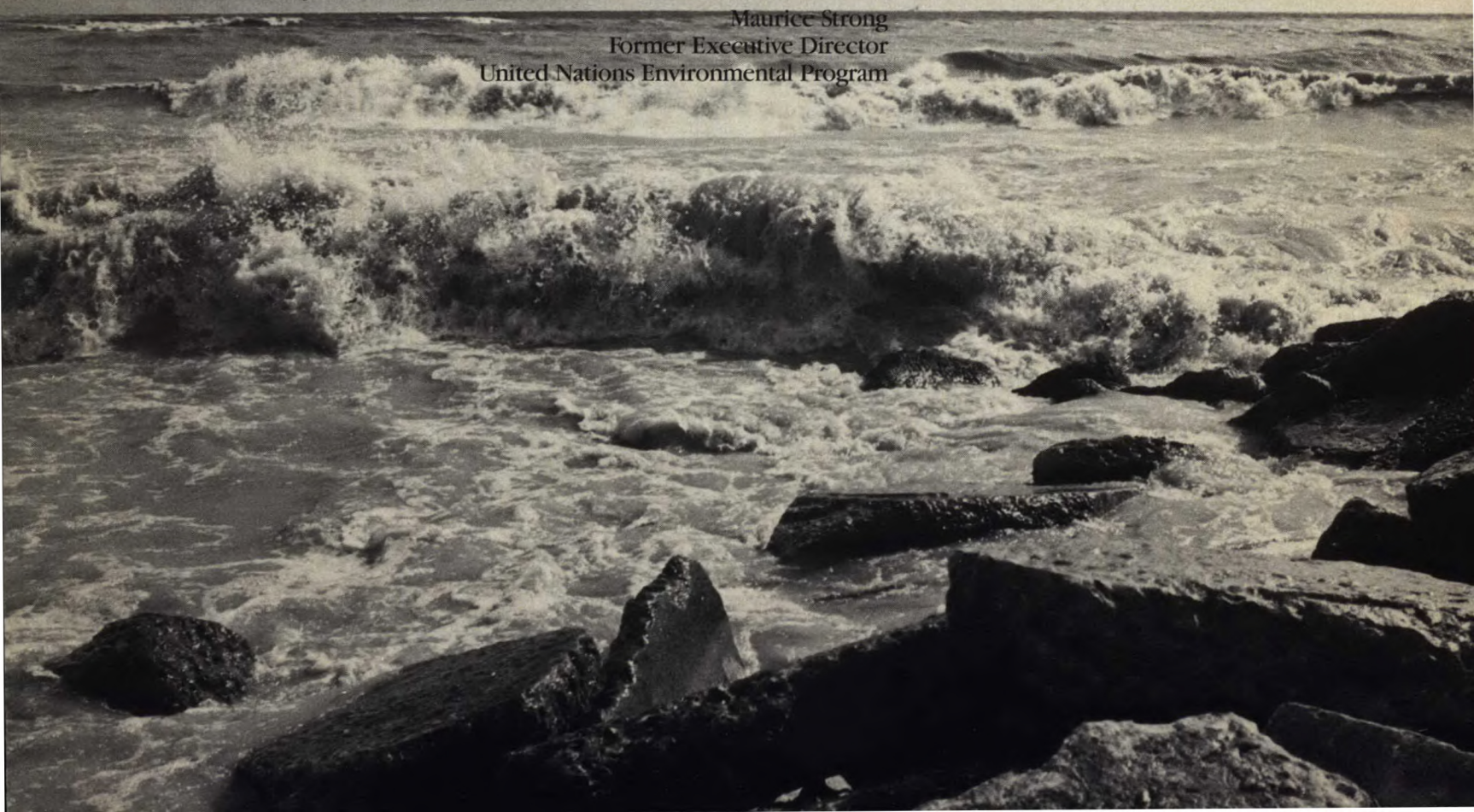
A lake is the landscape's most beautiful and expressive feature. It is the earth's eye; looking into which the beholder measures the depth of his own nature.

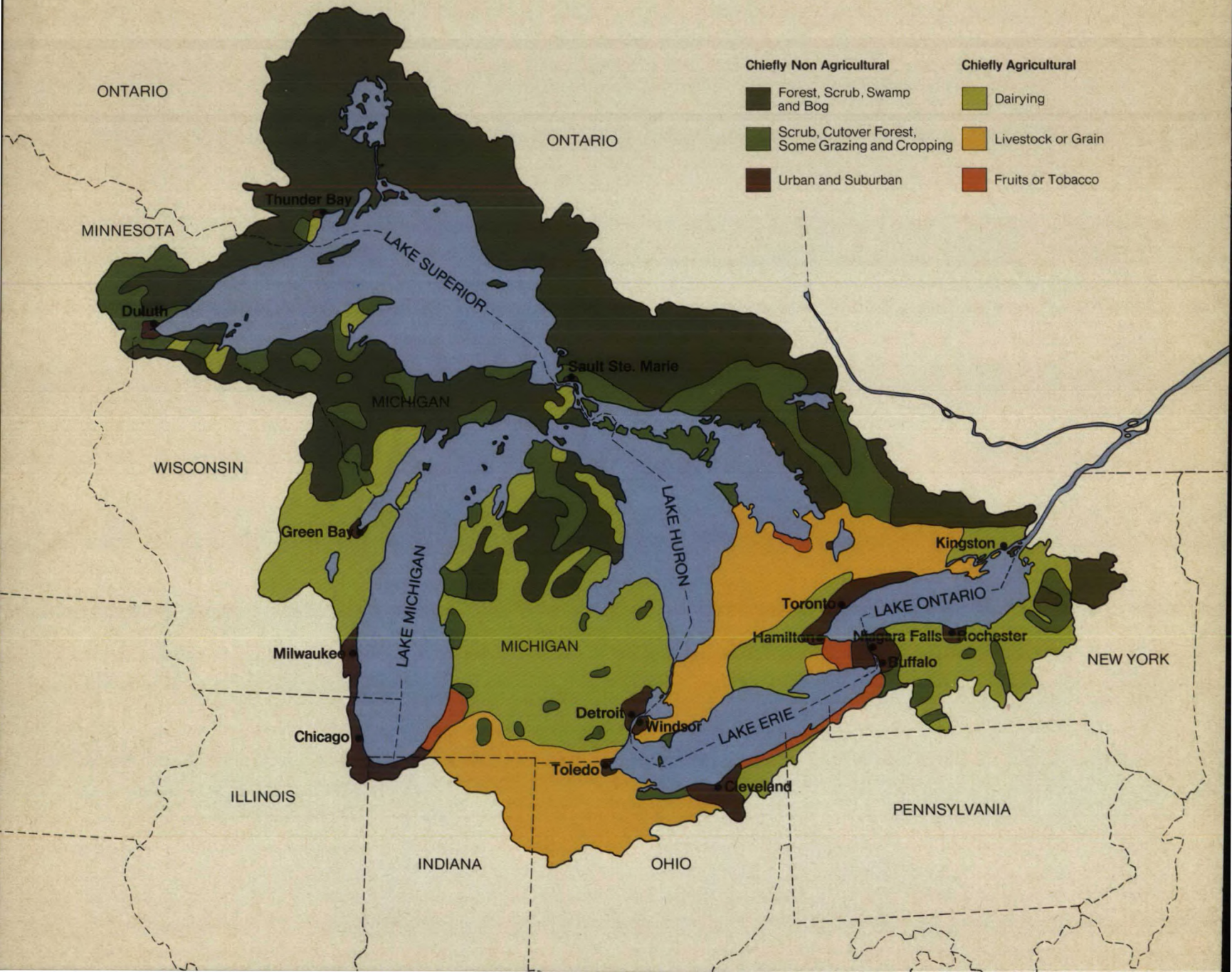
Henry David Thoreau, *Walden*

"We must make ecology and economics the allies they can be and should be in evolving a new approach to growth. Conservation must become a way of life and incentives for it must be built into our economic system ... What an irony it would be if this most enlightened, civilized and powerful generation should, through greed, blindness and neglect, bring about the end of the human experiment."

Maurice Strong
Former Executive Director
United Nations Environmental Program



LAND USE IN THE GREAT LAKES BASIN

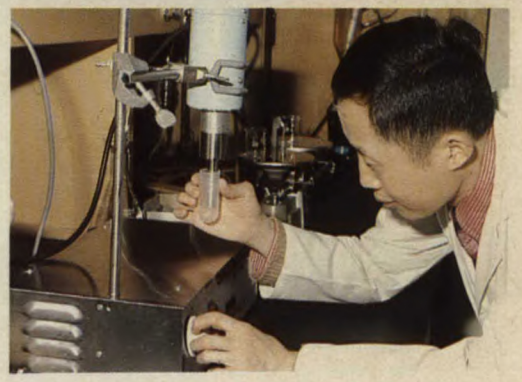


Foreword– The Canada-Ontario Agreement

The Great Lakes are Canada's most precious fresh water resource. They are also an international resource, and hence an international responsibility. This was recognized as long ago as 1909, when the Boundary Waters Treaty was signed by Canada and the United States. This treaty set up the International Joint Commission (IJC), composed of three members from each nation. Its purpose was to oversee boundary waters, including the Great Lakes, and to deal with serious problems.

In order to effectively marshal Canadian forces and co-ordinate our efforts on the Great Lakes, the Canada-Ontario Agreement was signed in 1971. Through the agreement, the federal and provincial governments synchronize their work in a variety of areas, such as research and development of pollution control measures, sewage treatment, surveillance and monitoring. The Canada-Ontario Agreement provided the framework for Canadian participation in the IJC, and proved its importance by paving the way for the Canada – United States Water Quality Agreement of 1972. This Agreement pledges governments in both countries to work together to restore and protect the Great Lakes.

This booklet is published by the Canada-Ontario Agreement Review Board. The Board, which oversees Agreement activities, is composed of representatives of federal and provincial agencies. It is our hope that the booklet will lead to a greater understanding of the Great Lakes ecosystem and prompt citizens to take an active interest in its present and continuing health.



Federal and provincial governments working together to keep a watchful eye on the water quality of the Great Lakes.

Introduction

The Great Lakes – Superior, Huron, Michigan, Erie and Ontario – make up the largest fresh water system in the world. Their influence on the Canadian people and on Canadian history and development has been immeasurable. The Great Lakes, and their river systems, provided highways of water for native people for centuries and later for the first white men who explored the continent. The lakes and their surrounding land areas have been rich sources of natural resources, and the lakes themselves made access to wealth possible. The lakes give us fish for our tables, irrigation for our crops, and energy for our homes and factories. Water from the Great Lakes slakes the thirst of one-third the population of Canada.

Radisson and Groseilliers

The famous explorer and adventurer Pierre Radisson, together with his lieutenant and brother-in-law Medard Groseilliers, left Quebec City in 1634 and began an epic journey which took them to the uncharted far shores of Lake Superior. Their explorations lasted several years, and when they finally started out on the return trip from Lake Superior, it was at the head of 360 canoes heavily laden with animal pelts. A reminder of their travels remains to this day in the name of Gooseberry River, which flows into northern Lake Superior. The river's name bears testimony to their passage and to the inability of the English to pronounce the name Groseilliers.

After the return of Radisson and Groseilliers the fur trade grew rapidly, and it continued to expand after the English established firm control over the Canadian side of the Great Lakes basin. In 1798, the Northwest Company sent back to Europe, in one year, the following pelts:

106 000 beaver	6 000 lynx
2 100 fox	600 wolverine
4 000 kit fox	1 600 fisher
4 600 otter	3 800 wolf
17 000 muskrat	700 elk
32 000 martin	1 950 deer
1 800 mink	500 buffalo

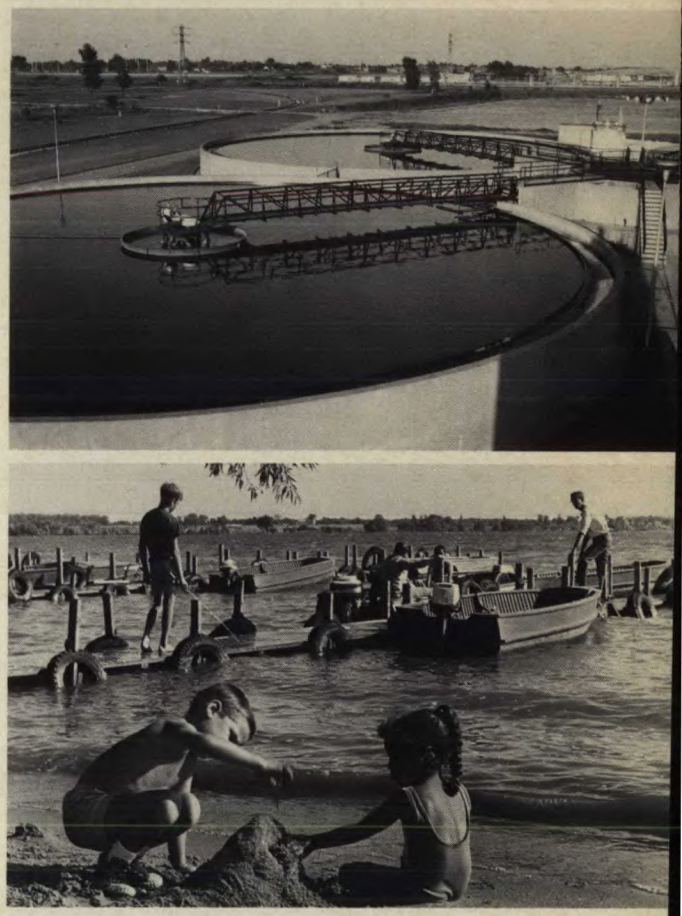
The roots of the Canadian economy in resource-based activity were already well established.

For the people of the entire nation, as well as for those who are actually physically dependent on them, the lakes are a resource in another extremely important, though less tangible sense. The Great Lakes are a strong symbol of what makes Canada Canada; they contribute a great deal to the myth or dream of nationhood that is part of the Canadian consciousness. In this sense, they are on a par with the mighty St. Lawrence that flows out of them, the Rocky Mountains, or the Arctic wilderness as a symbol of our nation. They provide beauty and refreshment for the senses, in the same way as our rugged Atlantic Coast, or the rain forests of British Columbia. The Great Lakes are far more than a mere geographical feature; as well as being a natural resource, they are a resource of the spirit.

Immense and magnificent as they are, the Great Lakes are not immortal. They age and may eventually deteriorate. Humans have made a tremendous impact upon them. The lakes have changed and aged more in the past few hundred years than in the whole 12 000 years since they were formed at the end of the last ice age. And the rate of change, the rate of deterioration, has accelerated greatly in the twentieth century.

So heavy is our society's reliance upon the Great Lakes that they are threatened from many quarters. The natural aging process of the lakes – eutrophication – is vastly speeded up by sewage and phosphates. Acid rain and the hazards posed by toxic chemicals are well known. Other threats, like urban sprawl and habitat destruction, are more subtle, though just as insidious. Where society has recognized problems and determined to do something about them, results have been encouraging; over the past decade, the water quality of the lakes has actually improved dramatically in some areas. Tremendous strides have been made in treating sewage and reducing phosphate pollution.

Unfortunately, in the past the environment was allowed to deteriorate before man became fully aware that action was required. Frequently this resulted in harm to wildlife, flora or water quality. The late Sixties and early Seventies saw a great heightening of public consciousness about environmental matters. This, combined with an increasing awareness that the lakes seemed to be dying, woke people up, and many clean-up measures were taken. Beaches that had been closed because of contaminated water were reopened, use of phosphates was drastically curtailed, sewage treatment was stepped up, and various programs for restocking the



Improved sewage treatment facilities (upper photo) have made beaches cleaner and drinking water safer.

Great Lakes with game fish met with notable success. A sense of optimism for the future was rekindled.

An entirely new set of problems has come to the fore in the Eighties, however, and some of the old difficulties have proven to be more persistent than was anticipated. Eutrophication continues, though at a vastly reduced rate. Acid rain does not yet threaten the Great Lakes themselves, but is a menace to land and tributaries in their watershed area. The tragic events at Love Canal on the American side of the border were followed by the discovery that toxic chemicals were leaching into the Niagara River. These events, combined with scientists' newly enhanced ability to detect minute quantities of chemical substances in water, shook public confidence in the safety of its drinking water. At the same time, our population makes increasing demands on the lakes. Furthermore, the harsh economic realities of the Eighties have caused delays in the installation of necessary (in some cases desperately needed) pollution control equipment. In the minds of some, the economy is forcing harsh choices to be made between economic and ecological considerations.

Any measures that will result in short-term or short-sighted savings, however, will prove to be false economy indeed if they are purchased at the cost of long-range and possibly irreversible damage to the Great Lakes. Experience has shown time and again that it is far cheaper to take preventive action than it is to clean up after an ecological disaster. Sometimes the ecological balance can never be restored.

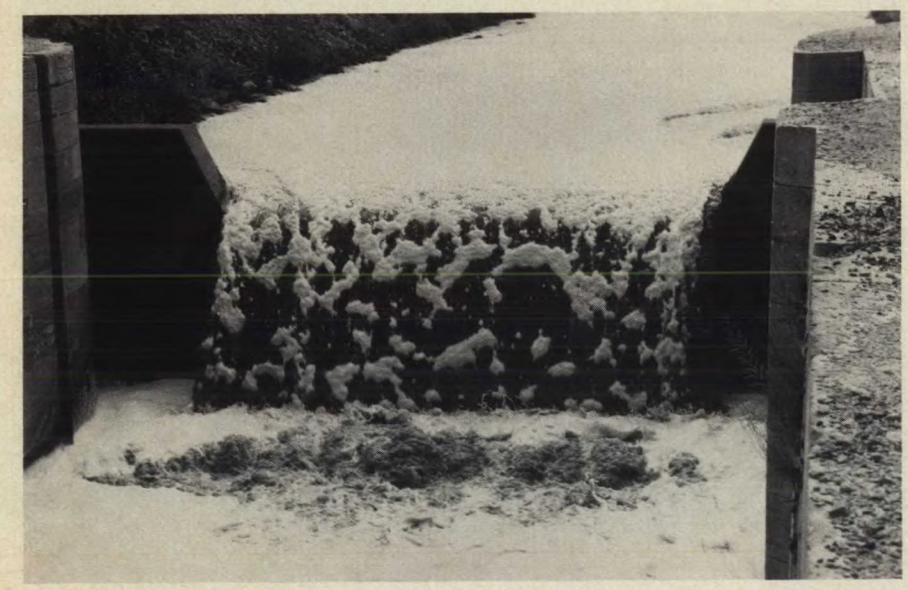
Society already has the technology to safeguard the Great Lakes. Human ingenuity can design factories that do not pollute, population growth can be planned and controlled to minimize impact upon the environment, and the causes of acid rain are well known and preventable. It is a matter of will. Society has demonstrated that it cares deeply about the Great Lakes, and is unwilling to see their further deterioration. Citizens in Canada and the United States demand nothing less than safe, clean drinking water. Significant gains have been made, and polluters have been forced to introduce control measures. We cannot allow this progress to be rolled back.

The time to protect the Great Lakes is *now.* Tomorrow will be too late. It is not a question of whether we can afford to save the Great Lakes, but rather, if we can afford *not* to save them.

Acid Rain

The acid rain which falls on Canada and the United States kills fish, eats away property, stunts and inhibits forests and food crops, and affects human health. Because of their size and the fact that they are able to neutralize acids, the Great Lakes are not directly affected by acid rain. However, the streams, tributaries and smaller lakes that surround and feed the Great Lakes are. Some of the rivers that lead into the Great Lakes are now too acid-stressed to allow spawning. Walleye which used to migrate from Lake Huron to streams draining into Eastern Georgian Bay can no longer go to these streams to breed. According to the International Joint Commission, if present trends continue, many inland ecosystems in the most susceptible parts of the basin may be irreversibly damaged within 10 to 15 years.

The mayfly (above) is an important food source for many types of fish. When pollution reduces the number of mayflies, the fish also decline.



The Ecosystem Approach

In 1953, scientists taking routine samples of bottom clay from Lake Erie were puzzled. They were checking for the presence of nymphs, insect larvae which were an important link in the Lake Erie food chain. Samples from an area about one half metre square produced 485 dead nymphs – and no live ones. In another area, which normally produced 1 087 live nymphs per square metre, not a single living nymph was found. These nymphs grew up to be mayflies: short-lived, delicate looking insects, with translucent wings and a long, streamer-like tail. Fish find both nymphs and mayflies to be extremely tasty, and fishermen have long designed flies and lures to look like these insects.

Mayflies used to swarm in great profusion on Lake Erie; now they are quite rare. Perch, pickerel, cisco and trout-perch would eat both mayfly and nymph. When nymphs would hatch into mayflies even bottom-feeding fish would come to the surface to dine. Hungry bass would flash out of the water to snap at them. Mayflies also provided an important dietary staple for many birds in the Lake Erie region, including robins, swallows and pheasants. This seemingly insignificant insect played an ecological role out of all proportion to its size, and its disappearance was a catastrophe to Lake Erie. The species of fish found in the lake have changed remarkably since the mayfly's demise.

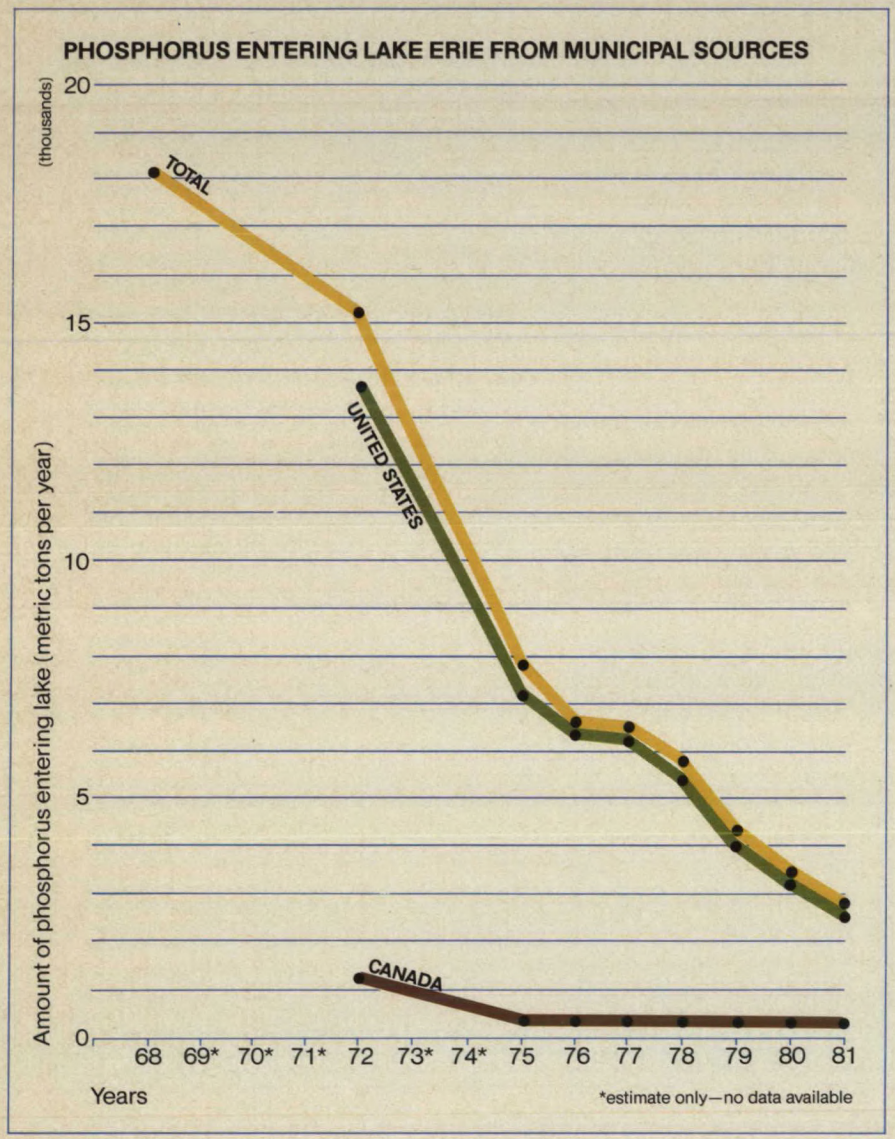
What happened? The answer provides a good example of an "ecosystem" in action, and demonstrates how things which affect one element within nature can set off a far-reaching chain of events that might have destructive consequences in an area far removed from the original point of impact.

As might be expected, the mayfly disappeared as a direct result of the pollution of Lake Erie. The shallow western end of the lake trapped tons of nutrients which poured in as stream runoff and as waste from major urban centres on both sides of the border. Fertilizer and soil washed off surrounding farmlands, and eventually found its way into the lake as well. The effluent that society let flow into the lake killed the mayfly by the seemingly harmless but lethal process of enrichment, the fertilization of aquatic plant life. Organic and inorganic nutrients, present as a result of human activity, served as fertilizers for algae – tiny aquatic plants – and species of larger plant life, which proliferated far beyond what would have normally occurred in nature. When the plants died, they sank to the bottom, where they were

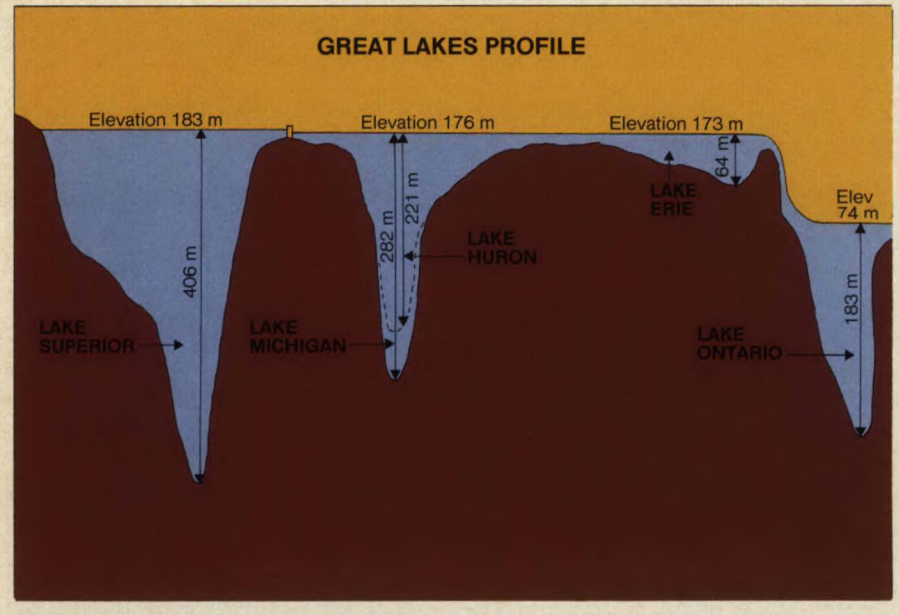
Salmon

At the beginning of the 1800s, salmon thrived in Lake Ontario, and record-breaking fish were routinely caught at the mouths of the Don and Credit Rivers. Sixty years later, there was scarcely a salmon to be found. Why? Not because of urbanization, pollution or overfishing. Ontario's burgeoning logging industry had cut down so many trees so fast that the salmon's spawning grounds were destroyed by silting and runoff.

Today, stocked coho salmon are doing quite nicely, and again can be seen swimming up Ontario's rivers to spawn. They now help support a multi-million dollar sport fishing industry.



Since phosphorus has been reduced in Lake Erie, floating mats of algae are now less common.



Runoff from surrounding farmland carries pesticides, fertilizers and soil into the lakes.

broken down by bacteria. Bacteria need oxygen to do their work, and the more they took from the bottom water to break down algae, the less there was left for the nymphs. When a long spell of unusually hot and still weather prevented oxygen from getting down to the lower depths of the lake, the mayflies were doomed. Oxygen levels fell below the crucial level, and the nymphs literally suffocated. The chemical balance of Lake Erie had changed beyond the point where the nymph, and hence the mayfly, could survive. And with the mayfly gone, other species had to change as well. Perch, pickerel, cisco and bass became scarcer and scarcer.

So the person curious about the changing species of fish in Lake Erie has to take a look at a long and complex chain of events; the species changed because they were part of a complicated, yet interlocking ecosystem. When one part of the delicate balance of life within the lake was affected, the reverberations were felt throughout the system.

Today, the amount of phosphorus entering Lake Erie has decreased by about 10 000 metric tons a year since 1972, and the ecosystem is again

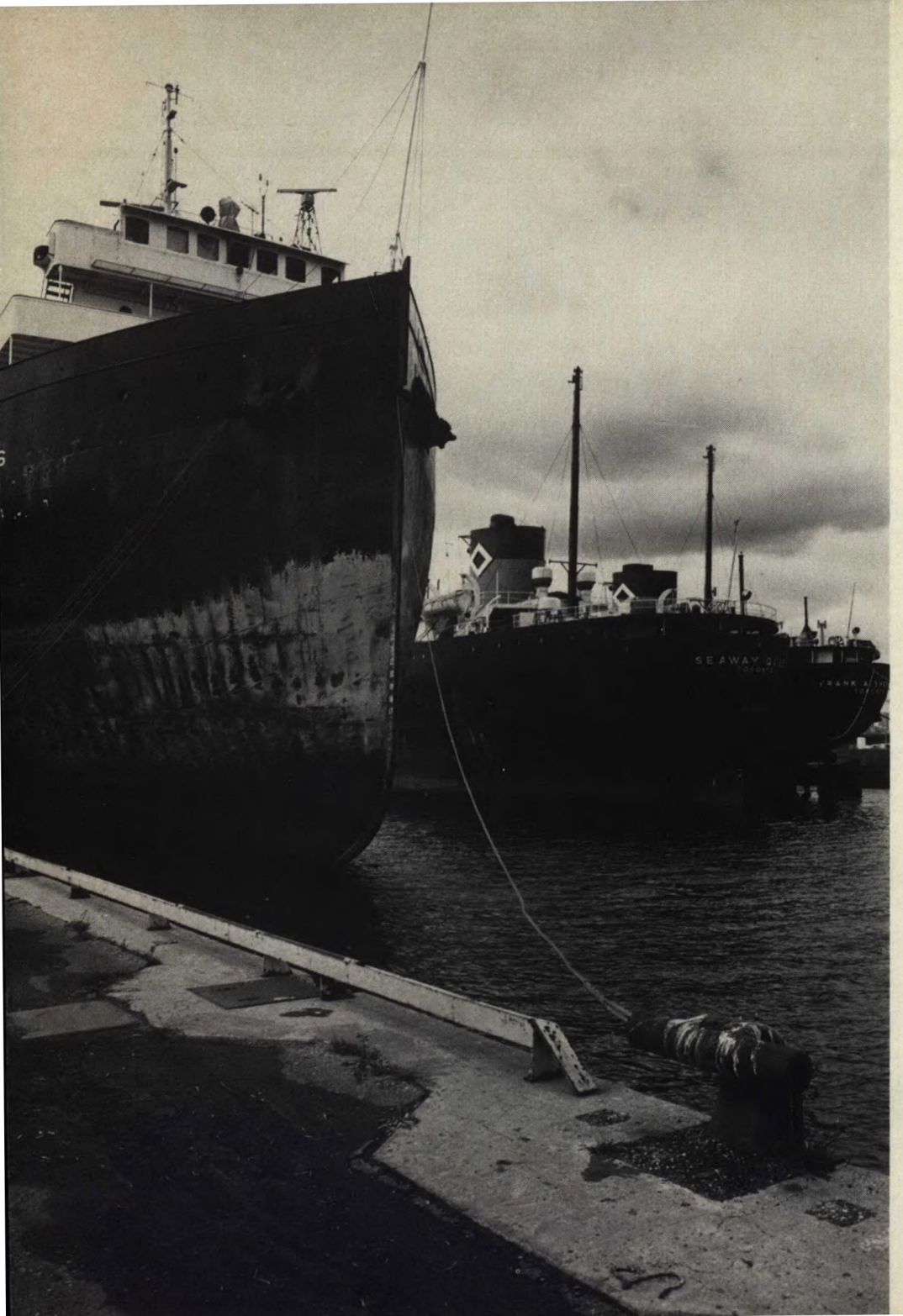
reacting to changes in its balance – this time in a positive way. With improvements in water quality, the mayfly has returned. Fish species associated with cleaner water, such as pickerel and bass, have made a significant comeback in Lake Erie. At one time fresh water perch had declined to the point of rarity; now, they support an expanding fishery in Lake Erie's western basin.

The story of the mayfly and the fall and rise of the Lake Erie fishery offers hope, and a good example of what can be done to restore and preserve the Great Lakes, if we respect and work within the framework of their ecosystem.

In an ecosystem all components, including man, interact in complex and often subtle, yet extremely important ways. The term can be used to refer to a body of water, an area of land with plants and a surrounding envelope of air, or even the entire earth. Actions that might have an impact upon the ecosystem cannot be considered in isolation, but must be considered in all their far-reaching implications. Humanity does not exist outside an ecosystem, but rather is an integral part of it.

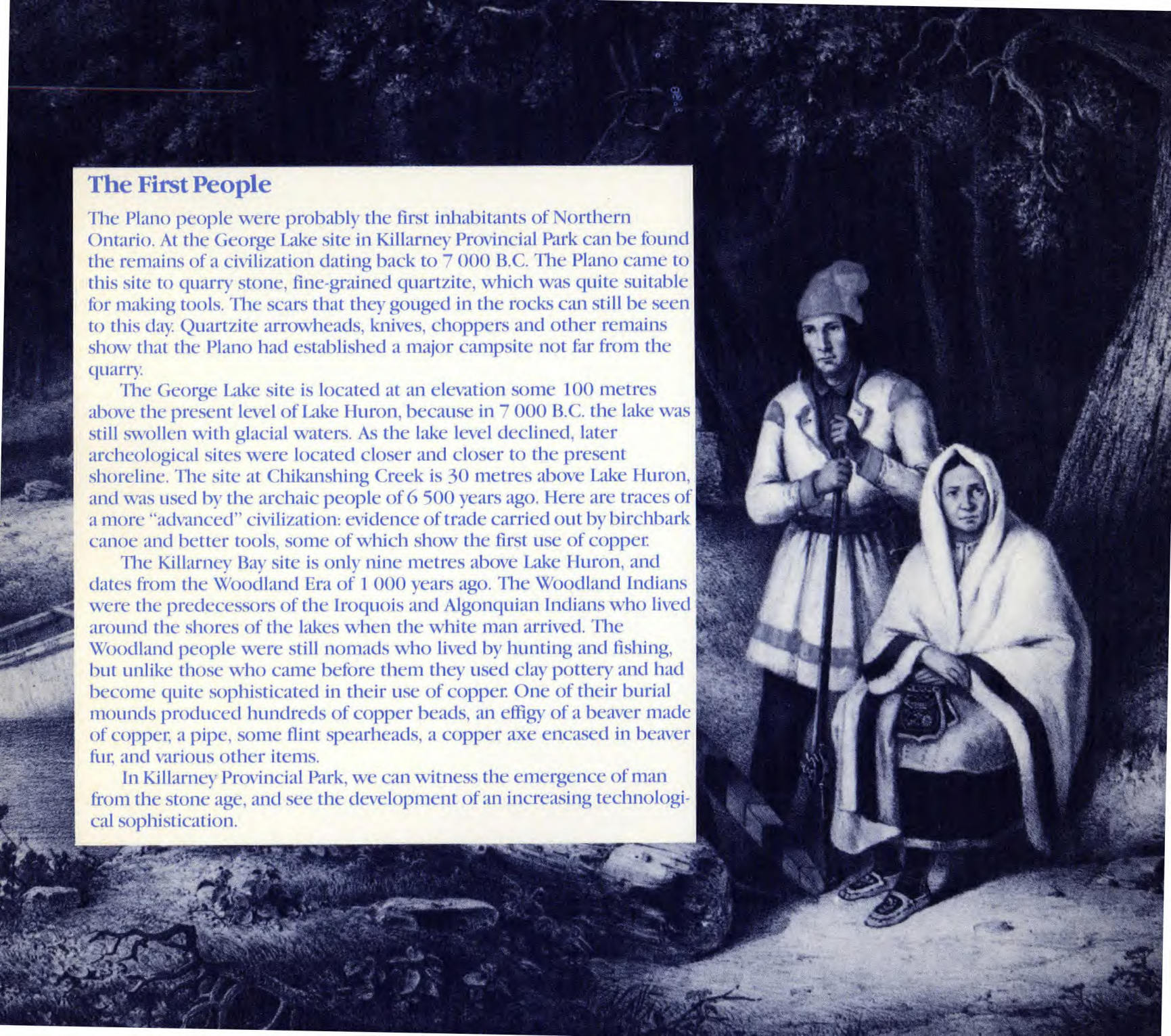
In 1978, the Great Lakes Water Quality Agreement between Canada and the United States was updated. The Great Lakes ecosystem was defined as "the interacting components of air, land, water, and living organisms, including man, within the drainage basin of the St. Lawrence River at or upstream from the point at which this river becomes the international boundary between Canada and the United States". The Agreement recognized humans as part of the ecosystem, and stated that ecological problems could no longer be considered in isolation: "... restoration and enhancement of the boundary waters cannot be achieved independently of other parts of the Great Lakes basin ecosystem with which these waters interact". Managing the Great Lakes as an ecosystem, composed of many interrelated elements and processes, means adopting what is called an *ecosystem approach.*

We have often failed to see, let alone anticipate, the "ripple effect" that a single change in the environmental balance can have. All this is indicative of *one* general problem: our failure, until now, to develop an ecosystem approach. This is why we must always view ourselves as part of the ecosystem, and carefully weigh the consequences of our actions. Those consequences will be around far longer than we will be.



St. Lawrence Seaway

Ontario and the American Midwest appear to be landlocked. In fact, inland waterways link us to the Atlantic Ocean and to the Gulf of Mexico. In one year, more cargo passes through the locks at Sault Ste. Marie, Ontario and Michigan, than goes through the Panama and Suez canals – combined.



The First People

The Plano people were probably the first inhabitants of Northern Ontario. At the George Lake site in Killarney Provincial Park can be found the remains of a civilization dating back to 7 000 B.C. The Plano came to this site to quarry stone, fine-grained quartzite, which was quite suitable for making tools. The scars that they gouged in the rocks can still be seen to this day. Quartzite arrowheads, knives, choppers and other remains show that the Plano had established a major campsite not far from the quarry.

The George Lake site is located at an elevation some 100 metres above the present level of Lake Huron, because in 7 000 B.C. the lake was still swollen with glacial waters. As the lake level declined, later archeological sites were located closer and closer to the present shoreline. The site at Chikanshing Creek is 30 metres above Lake Huron, and was used by the archaic people of 6 500 years ago. Here are traces of a more "advanced" civilization: evidence of trade carried out by birchbark canoe and better tools, some of which show the first use of copper.

The Killarney Bay site is only nine metres above Lake Huron, and dates from the Woodland Era of 1 000 years ago. The Woodland Indians were the predecessors of the Iroquois and Algonquian Indians who lived around the shores of the lakes when the white man arrived. The Woodland people were still nomads who lived by hunting and fishing, but unlike those who came before them they used clay pottery and had become quite sophisticated in their use of copper. One of their burial mounds produced hundreds of copper beads, an effigy of a beaver made of copper, a pipe, some flint spearheads, a copper axe encased in beaver fur, and various other items.

In Killarney Provincial Park, we can witness the emergence of man from the stone age, and see the development of an increasing technological sophistication.

The Greatest Problems

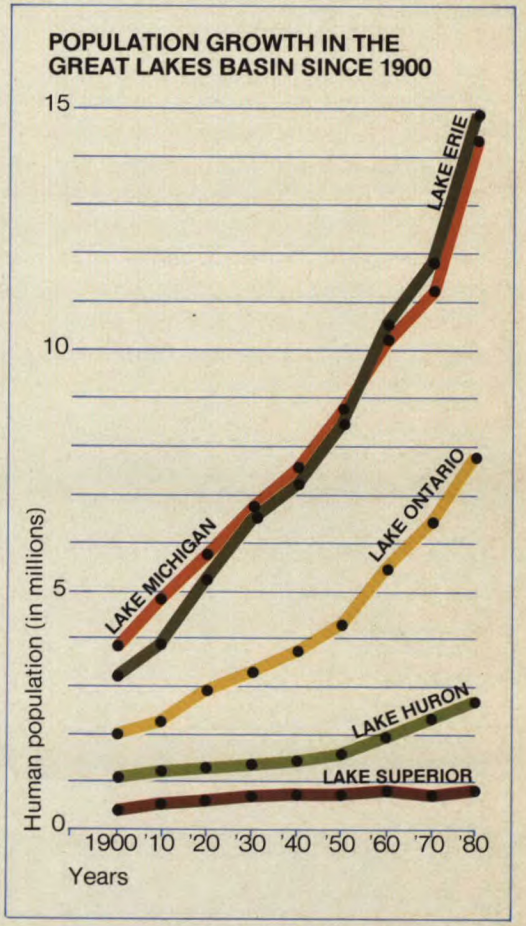
In 170 years, the population of the Great Lakes basin has increased more than a hundred fold, from 300 000 to 40 million. With all these people living, working and polluting in the area, it is little wonder that the lakes are in trouble. There is an old cliche that in the absence of man there are no environmental problems. The Great Lakes have been a blessing ever since the first prehistoric bands set up camp on their shores. Since the development of urban society, however, we have been exploiting the lakes in increasingly harmful ways. It took society almost 150 years to realize that it couldn't go on abusing and neglecting the Great Lakes forever; that, large as they were, unchecked pollution and unplanned growth were killing them.

The lakes were allowed to decline even though Canada and the United States have long recognized their importance. The Boundary Waters Treaty of 1909, which is still in force today, states in Article IV that "...boundary waters and water flowing across the boundary shall not be polluted on either side to the injury of health or property on the other side".

For all its good intentions, however, the treaty did little to prevent deterioration. By the late 1950s it was apparent that the lakes were in serious trouble. Untreated sewage was pouring into the shallower, more urbanized lakes like Erie and Ontario, threatening drinking water and in some cases forcing the closing of public beaches. Commercial and sport fisheries were in decline. Pesticides, such as DDT and its derivative DDE, were first detected in Lake Erie in 1959; they were found in Lake Ontario and the St. Lawrence River in 1963. Nutrients, oxygen depletion, bacterial contamination, accumulating solids, organic contaminants, oil and even radioactivity posed threats that could no longer be ignored.

The International Joint Commission was considered the best vehicle to combat the problems. As long ago as 1912 the IJC had investigated the serious problem of typhoid fever, and the establishment of chlorination plants and safe municipal water supplies came about as a direct result. (Ironically, it was thought at the turn of the century that effective drinking water plants eliminated the need for adequate sewage treatment, and cities continued to pour untreated wastes into the lakes, a situation that came back to haunt us 50 years later.)

In 1964, the IJC carried out a study of Lakes Erie and Ontario and the St. Lawrence River. The Commission confirmed that there were serious



problems in the lower Great Lakes. One symptom: the Ontario Water Resources Commission reported that Hamilton Harbour alone was receiving 220 tons of chemicals *per day.* Notwithstanding the emerging problem of toxic chemicals, however, the IJC found that the greatest threat at that time was a rapid deterioration due to nutrient enrichment, and that phosphorus was the main culprit. In 1965, the IJC recommended that Canada and the United States take action to ensure sufficient treatment of wastes before discharge, so that the maximum possible amount of phosphorus could be removed. A crash program was mounted to improve sewage treatment. Although that program was largely successful, the end result of enrichment, eutrophication, is still one of the major problems facing the Great Lakes. The other, and potentially greater threat is that posed by toxic chemicals.

Where Do Pollutants Come From?

There are three major ways in which pollutants enter the Great Lakes:

Airborne Pollution: In rain, in snow, or even as dry fallout, pollutants suspended in the air can descend into the Great Lakes. Such pollutants can include lead, mercury, phosphorus and PCBs, as well as sulphates and nitrates, the components of the notorious acid rain.

Surface Runoff Pollution: Water which drains off farmlands can carry fertilizers (nutrient pollutants) and pesticides into the lakes. Runoff from roads can bring lead, salt, animal wastes and other contaminants. Contamination from landfill sites enters the lakes through runoff and groundwater.

Point Sources: Effluent pipes from industry and from sewage treatment plants discharge into the lakes, and often release far too many pollutants.

Pea green coloured water, algae blooms, the smell of decaying plants, a funny taste in your drinking water, and carp where lake trout used to be – these are some of the signs of eutrophication.

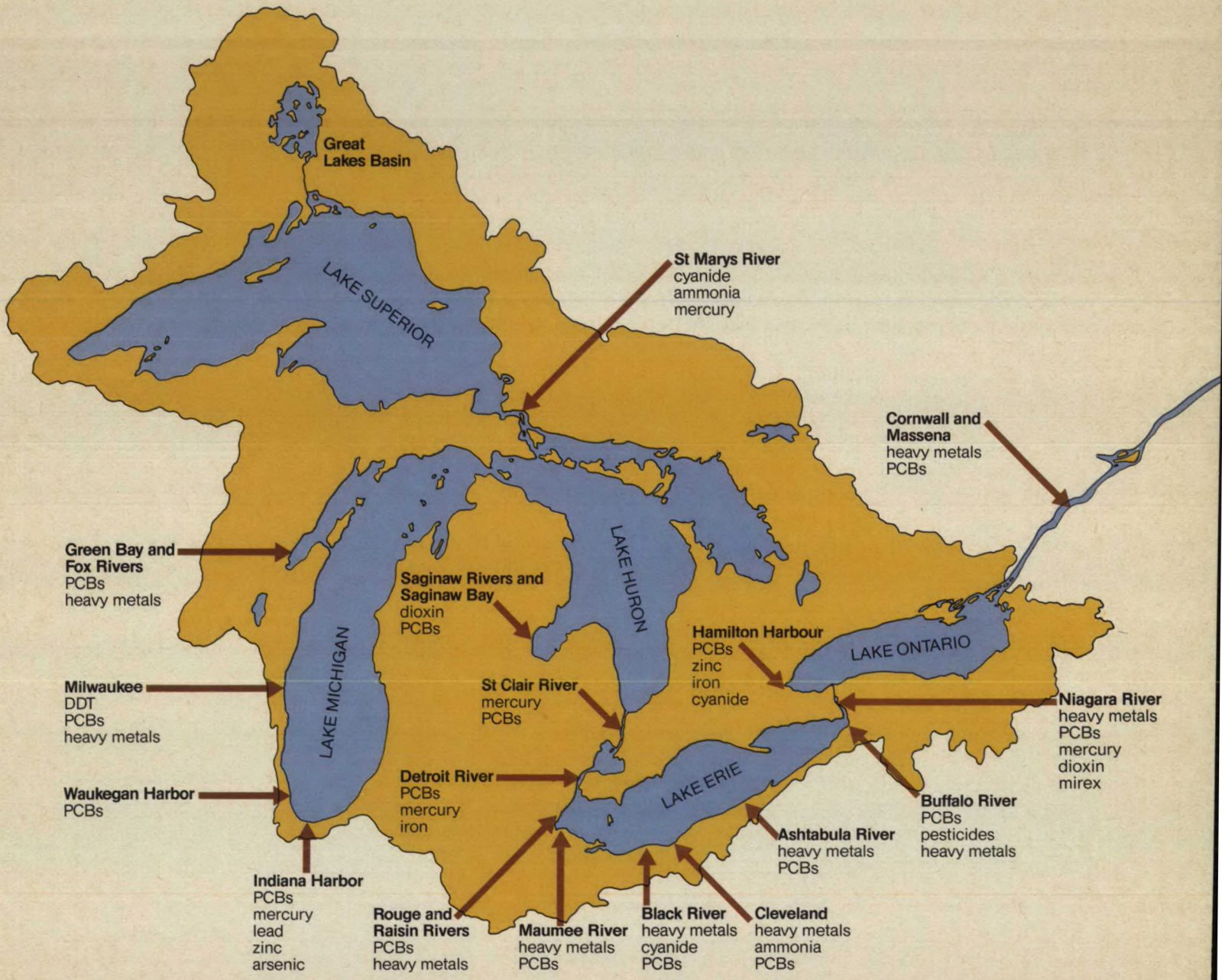
EUTROPHICATION

All lakes have a life cycle; it is perfectly correct to speak of a "young" lake or an "old" lake. Within any lake, there is a delicate balance among oxygen supply; animal, plant and aquatic life; and sediments. As we saw with the nymphs in Lake Erie, if there are too many nutrients, such as phosphorus, the lake becomes over-fertilized. Aquatic life proliferates, places too much demand on the limited amounts of oxygen the water can hold, and then begins to die and settle to the bottom. Phosphorus, from agricultural runoff and inadequately treated sewage, is one of the major causes of over-fertilization. Stream runoff and suspended matter in sewage also load large amounts of particles into the lakes. When these settle, along with the dead and decaying aquatic life that has been bred as a result of overfertilization, the sedimentation rate of a lake increases rapidly. Oxygen is exhausted and fish begin to die. The lake silts up and its aging process accelerates; when it reaches its final stages it becomes a swamp and at last, dry land. Lakes Ontario and Erie were already "middle-aged" when the white man arrived. It is estimated that in the first 50 years of the twentieth century, we aged Lake Erie the equivalent of 15 000 years.

Fortunately, once the alarm was sounded, Ontario awakened to the dangers. A program of provincially funded municipal sewage treatment plant construction was begun in the Fifties. This program continues today with the financial assistance of the federal government.

In Ontario, the battle against phosphorus and untreated municipal sewage has been largely successful. Treatment plants were built at a great rate across the province, and in the Seventies, the staggering sum of $991 million was spent or committed for sewage treatment plant construction. Rapid strides have been made in the United States, though some major centres such as Niagara Falls still lack proper treatment facilities. The progress that has been made in reducing phosphorus has been dramatic, and the rate of eutrophication has been reduced to something more near normal. Perhaps the greatest source of nutrients now entering the lake is agricultural runoff, with industrial pollution from the air, water and land also significant. The Canada Water Act of 1972 limited the use of phosphates in household detergents, a major source of phosphorus pollution, to 5 percent by weight. However, other products, such

TOXIC SUBSTANCES IN THE GREAT LAKES



as wetting agents, water softeners, and industrial cleaners, may still contain up to 45 percent phosphates by weight.

The fight that is being fought and is so far being won against phosphates and unnaturally fast eutrophication demonstrates that society and government have had the will, the desire and the capacity to halt the deterioration of the Great Lakes. That same will must be applied to the other major problem facing the Great Lakes: the menace of toxic chemicals.

TOXIC CHEMICALS

The increasing detection of toxic chemicals in the Great Lakes is the latest challenge we face. Here again we find ourselves having to make up for years of neglect. Over 70 000 chemicals are in use today, and 35 000 have been classified by the United States Environment Protection Agency as definite or potential threats to human health. New concoctions are being developed at the rate of 1 000 per year. Chemicals such as PCBs (polychlorinated biphenyls) can be extremely dangerous if uncontrolled. There is a need for the development and establishment of efficient methods of disposal for the PCB wastes which are now in storage in Ontario and American jurisdictions. The problem is compounded by the fact that, once in the food chain, many chemicals accumulate in the bodies of organisms that eat or drink substances that have been contaminated by them. The higher a species is in the food chain, the more the effect is magnified. Humans are at the top of the chain.

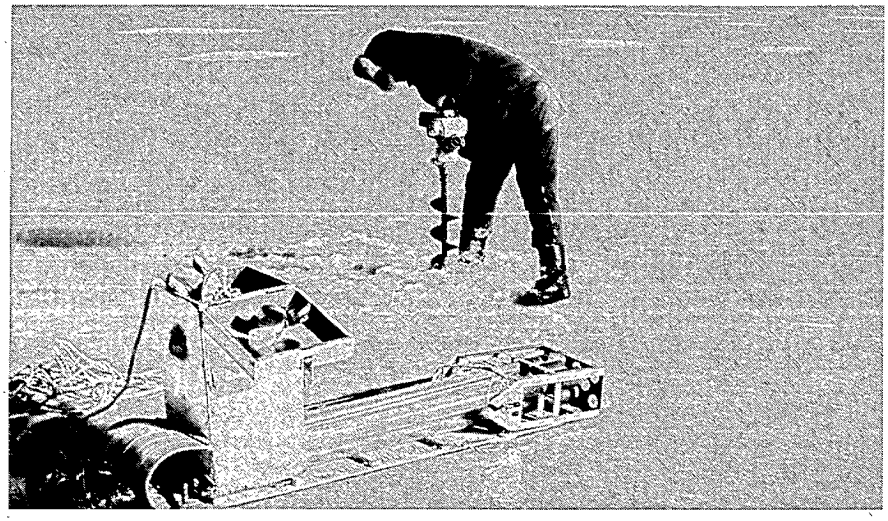
With the development of sophisticated monitoring equipment, we have discovered that the Great Lakes, Erie and Ontario in particular, are contaminated with hazardous substances. Trace elements in extremely small quantities are now detectable. Unfortunately in many cases, it is virtually impossible to say how much of a given chemical is too much. The exhaustive and expensive testing necessary to determine the amounts of a given chemical that are harmful has only been carried out on a fraction of the substances now in use. Some chemicals are so harmful that only a tiny bit, or a small accumulation, could cause serious illness or even death.

Furthermore, chemicals that are harmless or relatively harmless by themselves can become dangerous when they come in contact with other substances. These effects are extremely hard to predict, and there are so

many potential combinations, that it would be impractical as well as prohibitively expensive for scientists to test all the possibilities. Far better to keep the lakes from becoming contaminated with hazardous substances in the first place.

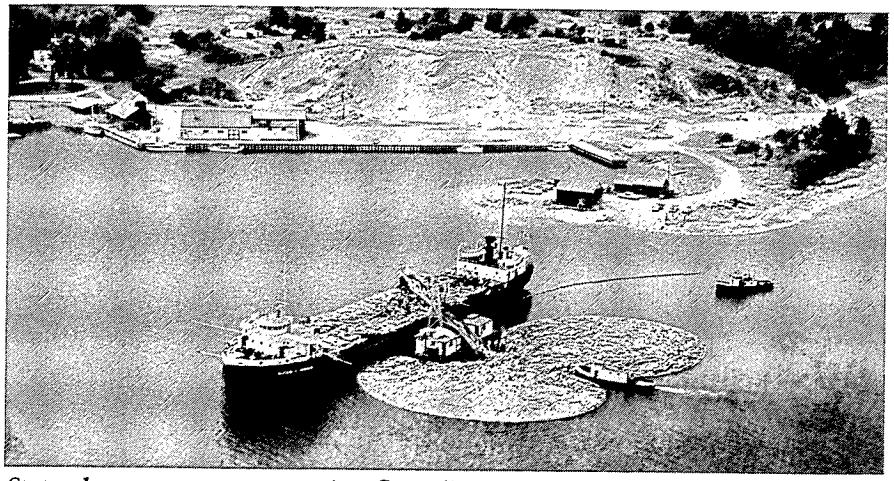
The toxics problem is also international. It has been estimated that the overwhelming portion of the chemical contamination of the Niagara River comes from sources on the United States side of the border. But toxics also find their way into the Great Lakes from sources on the Canadian side. Agricultural pesticides from land runoff and chemicals from industry are examples.

The seriousness of the trouble, and the need for fast and effective action, has been recognized by all. Canada has been in close consultation with the United States on such matters as the clean-up of the Niagara River. Both the federal and Ontario governments have developed or announced plans for the control and management of toxic chemicals. Inventories of toxic substances, crisis planning, cradle-to-grave tracking of toxics, and extensive investigative programs are a few of the measures being taken or advocated. Canada and Ontario together spend nearly $10 million per year monitoring and diagnosing the condition of the Great Lakes, with special attention paid to toxics. Great pains are taken to ensure that the United



Monitoring water quality is a year-round job (left and above).

Floating logs (right) are loaded onto a freighter.



States has access to extensive Canadian environmental data, and the two nations co-operate through the Great Lakes International Surveillance Plan. Although drinking water supplies meet present guidelines, these guidelines cover only a small percentage of the many chemicals that occur in the Great Lakes. Clearly, the toxics situation cannot be allowed to deteriorate further.

The toxics issue must be solved in two basic ways. First, as much as possible of the hazardous wastes that already exist must be destroyed or recycled, and when necessary, safe methods must be used to store wastes that cannot be destroyed. Second, industrial wastes must be eliminated or reduced, *at their source*, to the fullest extent possible. Plants must be designed to produce no waste, or as little as possible; greater efficiency means less waste. This is the long-term answer to the problem – human ingenuity. Such things as closed-loop systems and waste exchange (whereby the wastes of one process become the raw materials of another) can minimize or eliminate entirely the need for the disposal of toxic wastes. Systems like this already exist, and they are economically feasible.

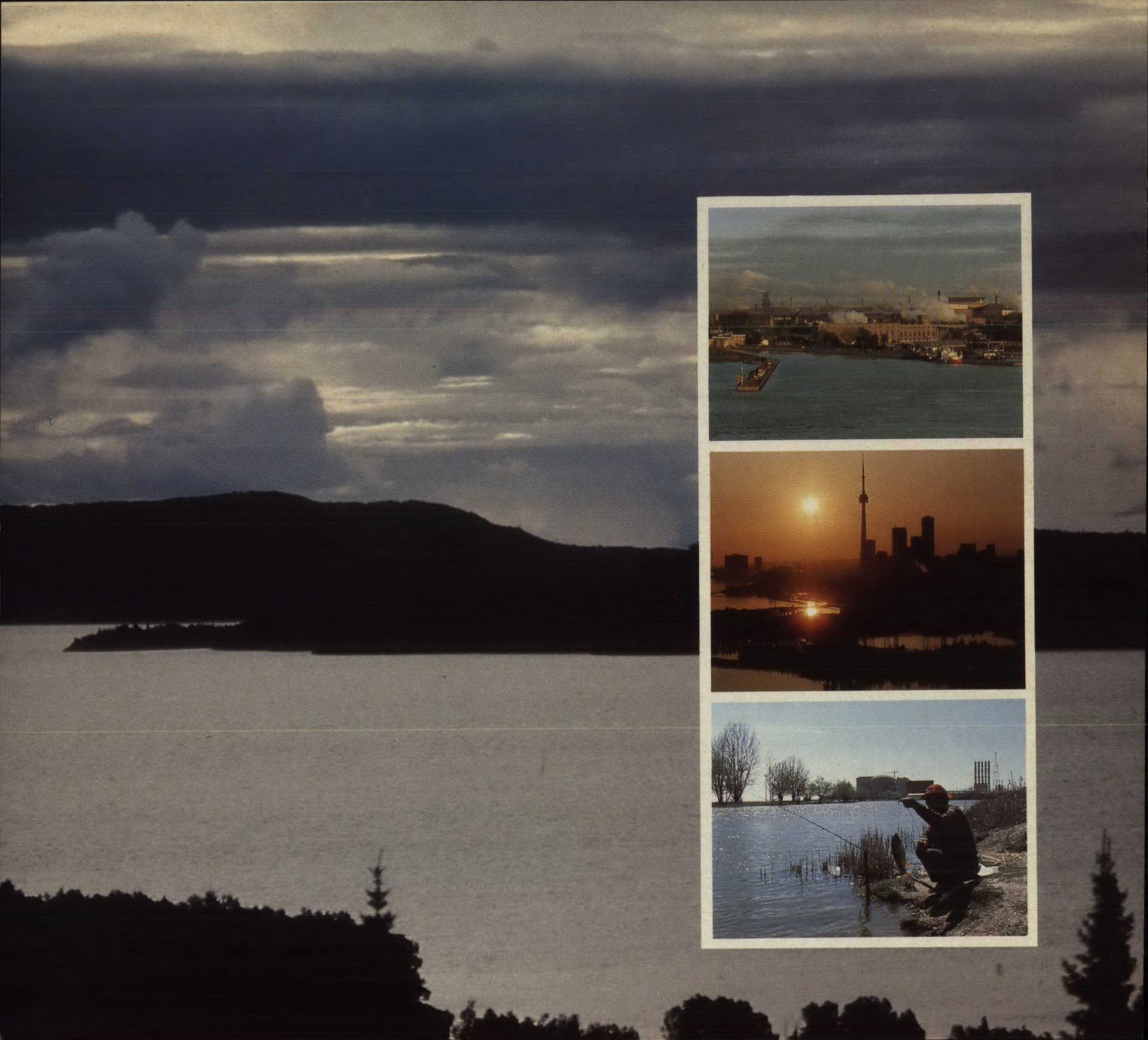
Society already has the technology necessary to reduce and eliminate toxics entering the Great Lakes. Whether we use it is a matter of will. If we want the benefits that chemicals can give us, then we must act responsibly in their use and disposal. If we don't clean up our act, we'll poison ourselves. It's as simple as that.

Predictions

The present population in the Great Lakes basin is around 37 million; this is expected to double in the next 40 years. Sixty percent of Ontario's population now lives in the six major urban centres of Toronto, Hamilton, Ottawa, Kitchener-Waterloo, London and Windsor, all within the Great Lakes watershed. It is forecast that by 2020, this will rise to 80 percent.

By the year 2020, the United States will require in the Great Lakes basin:

For power generation, 15 times more land than at present.
For power generation, 13 times more cooling water.
Eight times more industrial water.
Five times more irrigation water.
Twice as much sewage capacity.
Twice the present amount of land devoted to urban use.



Conclusion

The problems that the Great Lakes face don't begin and end with eutrophication and the toxics danger. These are merely the most pressing problems. Action also must be taken on other fronts.

Canada and the United States have taken somewhat different approaches in controlling pollution; each can learn from the other. Canada and Ontario have put in place an exemplary program of municipal waste treatment, while the more densely populated and industrialized United States has concentrated on regulating polluting industries.

Many other problems must be addressed as well, and it is time for Canada and the United States to expand their remedial programs into neglected areas. Dredging, for example, is necessary to allow continued access to shipping channels, yet can stir up sludge and dangerous contaminants that have settled to the lake bottoms. It is time also to turn our attention to the abatement and control of pollution from agriculture, forestry and other land use activities that have thus far received a minimum of attention. On both sides of the border, plants that contribute to acid rain must be brought under control.

In a larger sense, and from the point of view of those institutions and agencies that carry out society's mandates for both environmental concerns and resource production, much greater co-operation and planning is necessary. Environmental agencies such as Environment Canada and the Ontario Ministry of the Environment must co-ordinate their efforts with those of the resource agencies such as the federal Department of Energy, Mines and Resources, and provincial bodies like the Ministries of Natural Resources and Agriculture and Food. We can't avoid changing our ecosystem, but we can try to make sure that our use of natural resources and our habits of urban living have as little adverse impact as possible upon the environment.

There is also much that we can and must do as private citizens, if we are to be genuinely and seriously committed to saving the Great Lakes. On the most basic level, we can change our everyday activities which might make pollution worse. These include such things as using less energy, changing our transportation habits, and refusing to purchase items that could pose a threat to the environment.

We can also get involved as citizens; as the saying goes, if you're not part of the solution, you're part of the problem. There are many organized

citizens groups at work on Great Lakes issues, helping to alert us to opportunities for action. Political lobbying is also an effective activity that should not be underestimated or neglected. A political imperative must be created and sustained that will encourage politicians and agencies to take substantive action to protect our Great Lakes. Contact government agencies at all levels, on both sides of the border, to find out how they are living up to the Canada-U.S. Water Quality Agreement, and what steps they are taking to ensure compliance with its provisions. Urge elected representatives at all levels to adopt the necessary laws and regulations, and provide the money needed, to help restore and preserve the Great Lakes.

In the long run, society must decide what it really wants. We will have to strike a balance between environmental protection and our requirements for resources, energy, and the luxuries and necessities that our present lifestyle demands. This is essentially a moral and ethical question that is related to, yet goes far beyond, the issue of the Great Lakes. Our society must stop living beyond its environmental means; we must come to terms with the fact that we are human beings who live in, and are dependent upon, a fragile and limited ecosystem.

Humans are finally beginning to realize that they are part of the Great Lakes ecosystem; that they will have to live with the consequences of their actions for a long, long time. We no longer have the comfortable excuse of ignorance that our forebears had. If the Great Lakes continue to decline, it will be because we chose to let them. We must see to it that the magnificence of the Great Lakes is preserved for the benefit of our own and future generations.

CONTACT LIST

For further information about the Great Lakes, and what you can do to preserve and protect them, contact the following:

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Tel 519-256-7821

Environment Canada
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Toronto, Ontario
M4T 1M2
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Ontario Ministry of the Environment
135 St. Clair Avenue West
Toronto, Ontario
M4V 1P5
Tel 416-965-7117

Operation Clean Niagara
356 Regent Street
Niagara-on-the-Lake, Ontario
L0S 1J0
Tel 416-468-3328

Great Lakes Tomorrow
c/o The Conservation Council of Ontario
6th Floor, 45 Charles Street East
Toronto, Ontario
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Pollution Probe
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Great Lakes National Program Office (U.S. Environmental Protection Agency Region V)
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