

# FIVE-YEAR REPORT



Canada 

Québec 

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# MESSAGE FROM THE FEDERAL MINISTER OF THE ENVIRONMENT

## Working toward a sustainable, healthy St. Lawrence River

I am especially proud, in this International Year of Freshwater, to share with you the progress and significant accomplishments made under the third Canada–Quebec Action Plan on the St. Lawrence, better known as St. Lawrence Vision 2000. I am heartened by the major environmental gains that have been made, and the increasing involvement of riverside communities and various players in the field. I especially applaud the work of the ZIP committees, which rallied citizens to get more involved in decision-making and projects at the local level.

I am also happy to report that this year marks the culmination of 15 years of joint effort and fruitful collaboration between the governments of Quebec and Canada. Over the years, we have worked with partners in the private sector, universities, community organizations and citizens concerned about the protection, conservation, restoration and enhancement of the majestic St. Lawrence River.

According to the most recent portrait of the state of the St. Lawrence, the River is in better condition at the dawn of the 21st century than it was during the second half of the 20th century. While this is encouraging, many problems still exist, and certain uses, such as swimming and harvesting shellfish in the coastal waters, are still significantly restricted.

The future holds great challenges, especially with respect to better understanding and dealing with new stresses on the St. Lawrence ecosystem, such as the pollution generated by urban growth, climate change, fluctuating water levels, the introduction of exotic species, and the increasing number of uses. Careful identification of new pressures combined with a desire to take an approach based on sustainable development will serve the partners well over the coming years. For example, while working to better preserve the ecological integrity of the St. Lawrence, action will be taken to ensure that economic activities are more environmentally friendly. Our primary objective is to give back to Canadians a healthy St. Lawrence River.

Finally, I would like to thank all those who have stood by us faithfully since 1988 in this major project to save the St. Lawrence River, and I beckon everyone to continue to carry the flame for this magnificent river with the same level of dedication, commitment and interest.

David Anderson, Privy Council, Member of Parliament





# MESSAGE FROM THE QUEBEC MINISTER OF THE ENVIRONMENT

## Long live the St. Lawrence!

Initially, Québec and Canada's objective was to join forces to more effectively fight the chemical pollution of the river's waters and ecosystems. They then took a more ecosystem-oriented approach, built upon the strength and energy of community groups.

The results speak for themselves. We can all see that the St. Lawrence River is in better condition today than it was 15 years ago. Toxic contamination has been reduced and several uses of the river have been restored. We have also broadened and deepened our knowledge of the St. Lawrence and its ecosystems.

Québec now intends to implement the integrated management of the St. Lawrence and its watershed, as stipulated in the Québec Water Policy, and invites the federal government to work with him to meet this objective. This approach, which requires the support of players in the field and all those with decision-making power in regard to water uses, will take into account the interdependence of various activity sectors and the cumulative impact of initiatives.

If we are now prepared to take this new step, it is because for decades managers, politicians and committed citizens have worked together tirelessly on improving the condition of the St. Lawrence, and ensuring better public access to the river. Today, I would like to pay tribute to the incredible progress that they have made, and ask them to continue their unswerving efforts to improve and enhance the St. Lawrence. The challenge that lies ahead is even more daunting, given that we must now contend with climate change.

The issue of water remains critically important, especially during this International Year of Freshwater. The positive and stimulating results we are releasing will help us continue our pledge to protect the St. Lawrence.

Thomas J. Mulcair





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## WORD FROM THE CO-CHAIRS OF THE AGREEMENT

In this five-year report, we are proud to present the results of the joint efforts by government partners and riverside communities during Phase III of the St. Lawrence Action Plan (SLAP). The third Canada–Quebec Agreement for Joint Action on the St. Lawrence, which wound up on March 31, 2003, is a significant milestone in the conservation, protection and enhancement of the St. Lawrence ecosystem.

Although the target objectives and results for Phase III were ambitious, most of them were attained. Following 15 years of joint efforts focused on the St. Lawrence River, the results of Phase III testify to the relevance and effectiveness of this approach based on partnership and joint action.

There were many impressive accomplishments in the various components, and we will name but a few. In the Community Involvement component, more than 100 citizens' groups implemented 135 local projects with the financial support of the Community Interaction Program. The 14 Areas of Prime Concern (ZIP) committees made great strides in implementing their environmental remedial action plans (ERAPs). The Biosphère's ObservAction Network, which encourages the public to get involved in water and ecosystem conservation, has over 100 partners and enables the pooling of scientific research and public experience, while adding to databases on the Great Lakes–St. Lawrence ecosystem.

Among the four components whose objectives are to reduce the negative impacts of human activities, Navigation stood out by the amount of work accomplished in five years. For instance, a sustainable navigation strategy was developed for the St. Lawrence River that promotes the management of commercial shipping and pleasure boating activities and practices in harmony with environmental requirements and ecosystem protection, in partnership with shipping and pleasure boating organizations, and environmental and community action groups. In the Agriculture component, the Quebec government's Programme agroenvironnemental de soutien à la Stratégie phytosanitaire [agri-environmental support program for the pest management strategy] implemented nearly 100 technology transfer and development projects, which will contribute to reducing pesticide use. In the Industrial and Urban component, knowledge acquired on the toxicity of municipal effluents led to the identification of promising courses of action to promote the reduction of industrial pollution at source, particularly by small and medium-sized enterprises connected to municipal wastewater treatment plants. Finally, in the Human Health component, we took a preventive approach by informing the public how it could safely enjoy recreational activities, as well as consume drinking water and fish/shellfish taken from the St. Lawrence River.

We would like to underscore the exceptional work done in the Biodiversity component. Official protected status was granted to almost 108,000 new hectares of natural habitat. Citizens are gradually reclaiming the St. Lawrence and, with the financial support of the Access to the River program, 10 municipalities were able to make improvements that promote public access to the St. Lawrence. The State of the St. Lawrence Monitoring Program was implemented, and great strides were made in research on the impacts of fluctuating water levels.

We would like to thank all those who, guided by a common vision of the future of the great St. Lawrence ecosystem, played a role, either directly or indirectly, in these accomplishments.

Mimi Breton  
Co-Chair for Canada  
St. Lawrence Vision 2000

Pierre Baril  
Co-Chair for Quebec  
St. Lawrence Vision 2000

# PHASE III OF THE ST. LAWRENCE VISION 2000 ACTION PLAN

This St. Lawrence Vision 2000 report outlines the tangible, measurable results obtained over the five years of the action plan, which had three major objectives in terms of sustainable development: protection of human health, protection of the St. Lawrence ecosystem and increased involvement by riverside communities.


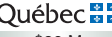

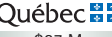


This report lists the highlights of the traditional components of the St. Lawrence Action Plan in relation to the protection of natural habitats, pollution prevention, and the management of the St. Lawrence by riverside communities. It also summarizes the great strides made by the new components in Phase III. These include, for example, the development of a sustainable navigation strategy, the acquisition of knowledge on the impacts of fluctuating water levels, the implementation of agricultural clean-up projects through a new funding program, and the implementation of a joint program to monitor the state of the St. Lawrence ecosystem.

Also described are the actions proposed during Phase III (1998–2003), and the results achieved during this five-year plan. The report includes a chapter on each of the six components, and various sections on communication activities, costs incurred by the Canadian and Quebec governments, and the socio-economic spinoffs of the plan over the past five years. In addition, there is a map at the end of the document illustrating the key results at the local level. Finally, to underscore the significance of the initiatives carried out over the years, the report lists the highlights of the past 15 years of joint efforts under a total of three Canada–Quebec Agreements for Joint Action on the St. Lawrence.

## Major inroads since 1988

Whereas the first five-year plan (1988–1993) focused on major problems such as industrial pollution and the protection of threatened natural habitats and species at risk, the two subsequent plans took a more ecosystem-oriented approach. Among other things, the creation of new components allowed us to involve new partners. The figure below outlines the components, the government partners committed to achieving results, and the amounts disbursed by the two governments over the various phases of the St. Lawrence Action Plan since 1988.

## Components in Phases I, II and III

<b>PHASE I Industrial Clean-Up</b>	Conservation	Industry and Restoration	State of the Environment
	 \$83 M	<ul style="list-style-type: none"> <li>Environment</li> <li>Fisheries and Oceans</li> <li>Industry, Science and Technology</li> </ul>	
	 \$30 M	<ul style="list-style-type: none"> <li>Environnement</li> <li>Loisir, Chasse et Pêche</li> </ul>	
<b>PHASE II Ecosystem Approach</b>	Biodiversity	Industry and Restoration	Decision Support
	Agriculture	Health	Community Involvement
	 \$84 M	<ul style="list-style-type: none"> <li>Environment</li> <li>Fisheries and Oceans</li> <li>Heritage</li> <li>Agriculture and Agri-Food</li> <li>Health</li> <li>Federal Office of Regional Development</li> </ul>	
	 \$87 M	<ul style="list-style-type: none"> <li>Environnement et Faune</li> <li>Santé et Services sociaux</li> <li>Agriculture, Pêcheries et Alimentation</li> </ul>	
<b>PHASE III Community Involvement</b>	Biodiversity	Industrial and Urban	Navigation
	Agriculture	Human Health	Community Involvement
	 \$118 M	<ul style="list-style-type: none"> <li>Environment</li> <li>Fisheries and Oceans</li> <li>Parks Canada Agency</li> <li>Agriculture and Agri-Food</li> <li>Health</li> <li>Transport</li> <li>Public Works and Government Services</li> <li>Canada Economic Development</li> </ul>	
	 \$185 M	<ul style="list-style-type: none"> <li>Environnement</li> <li>Faune et Parcs</li> <li>Santé et Services sociaux</li> <li>Agriculture, Pêcheries et Alimentation</li> <li>Transports</li> </ul>	



The current government partners involved in St. Lawrence Vision 2000 are as follows: Environment Canada, Agriculture and Agri-food Canada, Canada Economic Development, Parks Canada, Fisheries and Oceans Canada, Health Canada, Transport Canada, Public Works and Government Services Canada, the Ministère de l'Environnement du Québec [Quebec Department of the Environment], the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec [Quebec Department of Agriculture, Fisheries and Food], the Ministère de la Santé et des Services sociaux du Québec [Quebec Department of Health and Social Services], the Ministère des Transports du Québec [Quebec Department of Transport], and the Société de la faune et des parcs du Québec [Quebec Wildlife and Parks Corporation].

Non-governmental partners have also become increasingly involved over the years. The St. Lawrence Vision 2000 Advisory Committee, created in 1996, provides the Management Committee for the Canada–Quebec Agreement for Joint Action on the St. Lawrence with advice and guidance on the directions, methods for action and means of attaining the objectives

of the action plan. Seven motions and four forums focused mainly on partnership in managing the St. Lawrence and the dissemination of knowledge were submitted/held during Phase III (Web site: [www.comiteconsultatifslv2000.org](http://www.comiteconsultatifslv2000.org)—in French only).

In addition, since the start of Phase II, Stratégies Saint-Laurent (SSL) has been co-ordinating the Areas of Prime Concern (ZIP) program, as well as promoting it and ensuring support for the 14 ZIP committees. A community involvement forum entitled “The St. Lawrence River—in good hands” held in September 2001 was one of the most important activities organized by SSL during Phase III (Web site: [www.strategiessl.qc.ca](http://www.strategiessl.qc.ca)). For their part, the ZIP committees, promoted joint efforts within riverside communities and the implementation of their respective environmental remedial action plans.

Finally, it is important to point out the growing number of private sector and university partners, as well as environmental groups, schools and citizens, who are becoming involved in the various activities of the St. Lawrence Action Plan.

### An innovative contribution to sustainable development

In the pursuit of the objectives of Phase III of the St. Lawrence Action Plan, significant progress was made toward achieving the sustainable development of the St. Lawrence ecosystem. In addition to environmental spinoffs, specifically the protection of species and habitats, improved water quality and a reduction in pollutants, the Action Plan had noticeable economic and social impacts. Job creation, support for local industry, the transfer of technology and knowledge, reduction of industrial pollutants without loss of productivity, participation by communities, involvement of young people and public awareness of human health problems are all key factors in sustainable development. Lastly, the harmonization of measures taken by the Canadian and Quebec governments to protect and enhance the St. Lawrence River and tools to disseminate scientific knowledge and information generated under the St. Lawrence Action Plan are improving the coherence of initiatives and ensuring better governance.



# COMMUNITY INVOLVEMENT

The level of commitment of riverside communities to protecting the St. Lawrence River clearly illustrates the importance that citizens place on their living environment. Over the years, their many actions to protect and enhance the uses and resources of the St. Lawrence have led to significant progress in protecting the river's ecosystem. In addition, during the implementation of various projects, these actions have fostered joint action and the exchange of ideas between ZIP committees and non-governmental organizations.

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Photo: Ghislain Sylvain

## Helping build consensus in 14 riverside communities (ZIP)

The ZIP program is co-ordinated by the Community Involvement Co-operation Committee, co-chaired by a representative from each of the two governments, as well as by Stratégies Saint-Laurent (SSL). This organization provides the ZIP committees with technical and material support, co-ordinates their creation, ensures their joint efforts, and helps them explore future ways for securing community involvement.

On the territory covered by the St. Lawrence Action Plan, there are now 14 ZIP committees, as 4 new committees were created over the past 5 years: Îles de la Madeleine, Des Seigneuries, Les Deux Rives and Sud de l'Estuaire. The impressive participation by riverside communities can be largely attributed to the efforts of ZIP committee co-ordinators, who have been able to motivate their respective communities.

Under the ZIP program, the first thing a ZIP committee must do is present an assessment of environmental knowledge. Over the past five years, six new regional assessments presenting information on biological, physical-chemical and socio-economic resources have been released. The second step consists in holding a public consultation on the assessments in each sector. Finally, the last step is aimed at establishing action priorities for inclusion in the environmental remedial action plan (ERAP). Accordingly, all ZIP committees now have at least one ERAP.

## Target Results

Help build consensus in 14 riverside communities (ZIPs) on local environment issues under the co-ordination of Stratégies Saint-Laurent.

Give scientific and technical support to the ZIP committees.

Disseminate high-tech information on the St. Lawrence by way of the Biosphère Ecowatch Network and of an expertise and scientific popularization centre on health and environment.

Support the implementation of 150 community projects arising from ERAPs or the communities, giving priority to access to the St. Lawrence and recovery of uses.

## Providing scientific and technical support for ZIP committees

The production of environmental assessments required the input of many scientists from the Ministère de l'Environnement du Québec (MENV), the Société de la faune et des parcs du Québec (FAPAQ), Fisheries and Oceans Canada (DFO) and Environment Canada (EC). Subsequently, scientific support was provided in response to the issues raised by participants during the consultation process and the launch of ERAPs.

Several resource and habitat conservation, restoration and enhancement projects stemming from the ERAPs garnered support from both governments. Accordingly, biologists or other experts from the partner departments provided the ZIP committees with support and facilitated interactions. Five ZIP committees organized an event involving government partners and other players interested in the problems targeted by their ERAPs, the objective being to build a network and find solutions to complex problems.

A community involvement forum entitled "The St. Lawrence River—in good hands" held in September 2001 provided a snapshot of community involvement, and was an opportunity to identify the accomplishments of community organizations and discuss priorities with respect to community involvement, while providing an opportunity for networking. A workshop on integrated coastal zone management involving partners from coastal areas was also organized by DFO in Baie Comeau in winter 2002.



Photo: Biosphère, EC



Photo: Claire Michaud, MENV

## Disseminating the latest information on the St. Lawrence River

The Biosphère's *ObservAction* Network includes 104 member organizations, including schools, municipalities and non-governmental organizations (NGOs) (see map of key results). These members all have an interest in the waters and ecosystems of the Great Lakes and the St. Lawrence River, which spurs them to conduct experiments and gather and share scientific information. Liaison tools, such as the Internet and various newsletters, are used to release information on the St. Lawrence to members of the Biosphère's *ObservAction* Network.

At the same time, the Biosphère organized stimulating projects in schools, such as the Freshwater Fish Ecowatch Network, Adopt a River Network, H2O Project, and AQUAtox Network. It also created the Lower St. Lawrence Marine Mammal Ecowatch Network, which includes approximately 10 ecotourism companies and marine carriers operating in the region. This project's objective is to have the participants gather data on whales and seals in the St. Lawrence Gulf and Estuary while at sea. Training was given on the correct scientific method for collecting data.

However, the project to set up a centre of expertise and popular scientific information on the health and environment of the St. Lawrence was not completed due to lack of funds.

## Supporting the implementation of 150 community projects

The Community Interaction Program, supported by EC, MENV and FAPAQ, spawned 135 projects. These were implemented all along the St. Lawrence, at the places indicated on the map of key results. Most of these community projects were carried out within Areas of Prime Concern (ZIP) and were the culmination of activities outlined in the ERAPs. Fifty-eight NGOs received close to \$5.7 million in funding under the Program to implement these projects, which represented a total value of \$14.5 million. The initial budget was \$7 million but because of delays in program start-up, the amounts set aside for the first year could not be completely spent.

Projects were funded in several components, and their proponents succeeded in obtaining the support of riverside communities, as seen by the large number of volunteers. We have provided a description of each of the projects funded on the St. Lawrence Vision 2000 Web site.



Photo: Michel Chouinard, Bate des Chaleurs ZIP Committee



Photo: Haut Saint-Laurent ZIP Committee

Among the projects that have received funding, four in particular stand out. First, the Centre d'interprétation du milieu écologique du Haut-Richelieu focused on the Chinese water chestnut, an invasive exotic plant that is still threatening the biological integrity of the Richelieu River and, potentially, the St. Lawrence. It led a campaign to manually and mechanically eradicate the plant with the help of numerous volunteers. Second, on the Lower North Shore and Anticosti Island, the Côte Nord du Golfe ZIP Committee led a clean-up effort to remove and recycle several wrecked cars and metal waste from the territories of these isolated communities. Third, Nature Conservancy Canada acquired land on St. Vallier Point to ensure the protection of a pivotal biodiversity territory. Fourth, the collaborative activities initiated by the Jacques Cartier ZIP Committee contributed to advancing the issue of sediment clean-up in the bays in sector 103 of the Port of Montreal. Other success stories are posted on the SLV 2000 Web site.

## Organizations Funded Under the Community Interaction Program

Action Poissons Plus–Lac Saint-François	Fondation québécoise pour la protection du patrimoine naturel
Alma–Jonquière ZIP Committee	Granby Zoological Society
Association chasse et pêche “Les Riverains”	Groupe environnemental Uni-Vert–Région Matane
Association pour la revalorisation du barachois de Bonaventure	Haut Saint-Laurent ZIP Committee
Association touristique du Bas-Saint-Laurent	Héritage Laurentien
Attention Frag’Îles	Héritage Saint-Bernard
Baie des Chaleurs ZIP Committee	Îles de la Madeleine ZIP Committee
Centre d'interprétation du milieu écologique du Haut-Richelieu	Jacques Cartier ZIP Committee
Centre du développement durable du Saguenay–Lac-Saint-Jean	Lac Saint-Pierre ZIP Committee
Centre québécois du droit de l'environnement	Les Amis de la Réserve nationale de faune du lac Saint-François
Club vacances	Les Amis des Jardins de Métis
Comité de concertation et de valorisation du bassin de la rivière Richelieu	Nature Conservancy Canada
Comité de développement touristique de Franquelin inc.	Nature-Action Québec
Comité de l'environnement de Chicoutimi inc.	Quebec City and Chaudière–Appalaches ZIP Committee
Comité des citoyens de Pointe-Fortune inc.	Rive nord de l'estuaire ZIP Committee
Comité du marais de Saint-Antoine-de-Tilly	Saguenay ZIP Committee
Conseil régional de l'environnement de la Côte-Nord	Société d'aménagement de la baie Lavallière inc.
Corporation d'amélioration et de protection de l'environnement de Baie-Comeau	Société d'aménagement du parc des Îles de la Paix
Corporation d'aménagement et de protection de la Sainte-Anne	Société d'aménagement et de conservation des oiseaux migrateurs de Montmagny
Corporation de la Sauvagine de l'Isle-aux-Grues inc.	Société d'arboriculture du Saguenay
Corporation de l'Aménagement de la rivière L'Assomption	Société de conservation de Saint-Barthélemy, Saint-Joseph-de-Maskinongé
Corporation de protection de l'environnement de Sept-Îles inc.	Société de conservation des Îles-de-la-Madeleine
Corporation pour le développement de l'île Saint-Quentin	Société de conservation des milieux humides du Québec
Côte Nord du Golfe ZIP Committee	Société d'histoire naturelle de la vallée du Saint-Laurent
Crivert	Société Duvetnor Itée
Ducks Unlimited	Société pour la conservation de la tourbière de Lanoraie
Explos-Nature	Stratégies Saint-Laurent
Fabrique de la paroisse Saint-Anicet	Tourisme Cap-Saint-Ignace–Comité Culture et patrimoine
Fédération québécoise de la faune	Ville Marie ZIP Committee



# HUMAN HEALTH

The St. Lawrence River is a precious collective resource to be enjoyed by all Quebecers. Among its numerous uses, note that it is a source of drinking water for 45% of Quebecers, yields a wide variety of food products (fish, shellfish, waterfowl), and has a high potential for recreational activities. These uses are highly dependent on water quality. Starting in the early 1960s, the public became increasingly aware of the deteriorating water quality in the St. Lawrence, leading it to first question and then abandon the river. Today, after billions of dollars have been invested in cleaning up the St. Lawrence River and its tributaries, we can see tangible improvements—people are regaining confidence and rediscovering the St. Lawrence, and public access to the river has become a concern.

Activities in the Human Health component have generated knowledge on the risks of consuming drinking water and fish/shellfish from the St. Lawrence, as well as the risks associated with recreational activities on its waters.

## Recreational waters

The St. Lawrence, like Quebec's many lakes and rivers, has a high recreational potential for activities in the water, such as swimming, windsurfing and scuba diving, and activities on the water, such as pleasure boating, canoeing, and sport hunting and fishing. Surveys conducted in 1995 and 2001 show that fewer than 10% of riverside inhabitants practise recreational activities involving direct contact with the water of the St. Lawrence. However, more than one-third of the remainder would be prepared to change their habits if told the water was safe.



Photo: Madeleine Papineau, EC

## Target Results

Reduce the public's exposure to waters used for outdoor recreation where there is a risk of microbiological contamination.

Reduce public exposure to drinking water where there is a risk of chemical and microbiological contamination.

Reduce the public's exposure to consumption of aquatic products where there is a risk of organic and inorganic contamination.

The Ministère de l'Environnement du Québec, in co-operation with health care system specialists, evaluated water quality at some 40 potential swimming spots between Montreal and Île d'Orléans. Close to half of these spots are

suitable for swimming, with bacterial contamination being lower than the designated levels for swimming over 70% of the time. However, at other sites, the bacterial quality is very poor and does not permit recreational use. Close to shore, near urban areas, wastewater overflow following rainstorms are the main cause of contamination.

Blue-green algae (cyanobacteria) have been detected at several swimming spots in the Yamaska River watershed and Missisquoi Bay (Lake Champlain). Studies have shown that in some circumstances, the quantity of blue-green algae was sufficiently high to pose a potential health risk during activities in the water.

## Drinking water

Two epidemiological studies were conducted in eastern Quebec and Montérégie, the goal of the latter being to establish links between gastrointestinal diseases due to animal waste in the Yamaska River and water consumption. In other sectors, despite rather good drinking water, certain pathogenic micro-organisms that could cause infectious diseases were detected.

An action guide on how to deal with drinking water contamination (real or perceived) following an event such as a major chemical or oil spill in the river was drawn up for the regional public health boards, which led to an improved level of emergency preparedness.

## Seafood and other products of the river

Communities bordering the sea have their own special dietary practices. A monitoring program was implemented in all health care institutions in the Gulf of St. Lawrence region where shellfish are harvested. The intent was to record cases of toxic effects due to exposure to micro-organisms or marine toxins. Three ZIP committees handed out information to harvesters. Four of the seven public awareness projects indicated on the map of key results concern contaminated shellfish. Two other projects raised awareness about the risks associated with eating fish from the St. Lawrence River (Saguenay ZIP and Lac St-Pierre ZIP).

In addition, a program to monitor exposure of newborns to organochlorines on the Middle and Lower North Shore, begun during the previous phase, was continued. The program showed that organochlorines in newborns decreased by almost 56% between 1993 and 2000 due, among other things, to pregnant women eating fewer seabird eggs.

A study of 550 licensed waterfowl hunters was conducted to assess the risk related to eating waterfowl. Since the hunters eat very little of their catch, the risk of contamination is low. Another study on the health issues related to hunting and eating seals was conducted in collaboration with local health care institutions and hunting clubs. It appears the main health risks are related more to personal safety when hunting than to exposure to environmental contaminants when eating seal.

In the Saguenay, sportfishers (ice fishers) were evaluated for exposure to contaminants by eating the fish. In Montreal, another study of an underprivileged population that fishes off Promenade Bellerive revealed the activity's positive psychosocial impact. Both studies showed that there is no specific risk when the general consumption guidelines are followed.

Finally, a public document on the food potential of the St. Lawrence's aquatic resources, the *St. Lawrence Food Guide*, is now available on the St. Lawrence Vision 2000 Web site. The guide is an excellent tool for promoting the various uses of the St. Lawrence.

In 2001, a survey was conducted of 4,000 riverside inhabitants to better understand their perceptions and behaviours. We also wanted to gauge change by comparing these results with those obtained in 1995 during Phase II, allowing us in turn to guide future research and initiatives. Regarding sportfishing in the St. Lawrence, the survey showed that 9.7% of the riverside population (290,000 people) fished in the River. Of this number, 160,000 ate their catch.



# ECOSYSTEM HEALTH

## Agriculture

Quebec has over 32,000 agricultural enterprises. Citizens and consumers demand that they balance profitability, the environment and product quality in a highly competitive market. The intensification of agricultural production in recent decades has placed added pressure on natural resources, especially water. As agricultural pollution is mostly non-point source pollution, it is difficult to control. Reducing it requires adopting better agri-environmental practices on the farm and more concerted action throughout the entire territory.

The main objective of the Agriculture component was to reduce pesticide use and the risks associated with using pesticides on targeted crops (grains, corn, soybeans, apples and potatoes). This was done by applying agri-environmental management practices to the targeted crops, which account for 70% of all agricultural pesticides used; a large portion of these pesticides are herbicides.

## Reducing the use of agricultural pesticides

Under Phase II of the St. Lawrence Vision 2000 Action Plan, studies revealed the presence of agricultural pesticides, particularly herbicides used on field crops (corn and soybeans), in several tributaries of the St. Lawrence. Moreover, pesticides were also detected in the groundwater in areas with intense potato farming activity.

Since 1998, the Ministère de l'Environnement du Québec (MENV) has continued to monitor pesticides at four stations located on the St. Zéphirin, Chibouet, Des Hurons and St. Régis rivers. The data collected indicate the presence of a wide variety of pesticides in the water. While concentrations of atrazine have decreased, concentrations of all other products measured have remained stable, and new pesticides have appeared in the water. The presence of pesticides in the environment remains a concern for all citizens, especially for the farmers who use them.

Farm production may be threatened by nuisance species (insects, weeds, pathogenic agents, etc.), which farmers fight using a variety of means, including pesticides. The integrated management approach, also called "integrated pest management," offers farmers a variety of methods that can be adapted to their specific crops, thereby enabling them to reduce and streamline pesticide use. A combination of preventive and curative pest management methods ensures more lasting, and often more effective, reduction in populations of nuisance species, and decreases the risks associated with the exclusive use of chemical pesticides, which are just one aspect of integrated pest management and must be used only when justified.

## Target Results

Reduce by 50% the use of pesticides and obtain 70% of the area under integrated control measures by 2003 and follow-up to verify the achievement of results.

Set up 5 advisory clubs on the Boyer River in order to ensure an agro-environmental management of the watershed and to reestablish smelt.

Validate an indicator on the risks of surface water contamination by phosphorus.

Carry out control and inspection in the area of agricultural cleaning up and make agricultural industries conform to the *Règlement sur la réduction de la pollution d'origine agricole* on the St. Lawrence tributaries.

Farmers can benefit from assistance or tools, including pest monitoring by the Réseau d'avertissements phytosanitaires [crop protection warning network], the use of predictive agrometeorology services and non-chemical pest management methods, including natural predators and mechanical weeding machines. To this end, Environment Canada and Agriculture and Agri-Food Canada have established agrometeorology forecasting models based on mathematical models combined with meteorological observations. For example, CIPRA (Computer Centre for Agricultural Pest Forecasting) software is used to detect favourable conditions for the development of insects and harmful crop diseases and therefore, determine the ideal intervention periods.



Photo: Marc Lajoie, MAPAQ

Thanks to the Quebec pest management strategy, the agricultural sector has made real progress in integrated pest management and the judicious use of pesticides. Launched in 1998, the Programme agroenvironnemental de soutien à la Stratégie phytosanitaire [agri-environmental support program for the pest management strategy] part of the Agriculture component of St. Lawrence Vision 2000 was implemented to support the pest management strategy begun in 1992 by the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec (MAPAQ). This program clearly made integrated pest management the preferred method of pursuing the objective of reducing pesticide use by 50% by 2003.

The Program was implemented to support development projects and training and technology transfer projects. The field crop projects had several objectives: reduce the amount of pesticides used, validate mechanical weeding

techniques and gradually introduce various integrated pest management practices. The apple projects focused mainly on developing a new type of anti-drift sprayer and seeking alternative solutions to pesticides, such as predator mites and the use of urea. The potato projects focused mainly on managing the Colorado potato beetle, reducing herbicide use and promoting non-chemical weeding. The awareness and training materials produced for these projects were extremely useful; over 400,000 copies of the various publications were handed out. The 93 projects funded by the program led to agricultural activities in over 125 municipalities (see the map of key results).



Photo: Marc Lajoie, MAPAQ

### Breakdown of Funds for the Pest Management Strategy Agri-environmental Support Program

Fiscal Year	Project Category	Number of Projects	Amounts Allocated
1998-1999	Technology transfer	14	\$ 218 063
	Technology development	12	\$ 358 281
	Training	11	\$ 305 448
	<b>Total</b>	<b>37</b>	<b>\$ 881 792</b>
1999-2000	Technology transfer	8	\$ 169 417
	Technology development	6	\$ 209 514
	Training	0	\$ 0
	<b>Total</b>	<b>14</b>	<b>\$ 378 931</b>
2000-2001	Technology transfer	11	\$ 253 101
	Technology development	5	\$ 175 902
	Training	0	\$ 0
	<b>Total</b>	<b>16</b>	<b>\$ 429 003</b>
2001-2002	Technology transfer	24	\$ 416 572
	Technology development	0	\$ 0
	Training	2	\$ 41 653
	<b>Total</b>	<b>26</b>	<b>\$ 458 225</b>
2002-2003	<b>Total</b>	<b>0</b>	<b>\$ 0</b>
	<b>Global total</b>	<b>93</b>	<b>\$ 2 147 951</b>

All of the actions since 1998 have helped raise the collective awareness of the various parties involved about the importance of integrated pest management. A small number of agricultural operations (all members of the 79 agri-environmental advisory clubs) were monitored to ensure they were pursuing the objective of integrated pest management. Accordingly, in March 2002, the cultivated area committed (in whole or in part) to integrated pest management—mainly field crop areas—exceeded 92,215 ha, increasing in total proportion from 3% in 1998 to 39% in 2001 (11% in 1999 and 24% in 2000). Based on the progress observed, this figure should be over 50% in 2003.

Because of a lack of information on the actual use of pesticides on targeted crops, we evaluated the extent to which the objective to reduce pesticides in the Agriculture component was attained based on MENV data used to establish Quebec pesticide sales figures. Only data from 1997, 1998 and 1999 are available (because of the delay in gathering and processing information).

The results indicator used is a pressure index, which represents the quantities of active herbicides used per hectare on targeted crops. Herbicides are used in this pressure index because they are more specific to the targeted crops, and because their reduction was the focus of more sustained efforts and interventions than other types of pesticides (fungicides, insecticides, etc.). Despite the fact that Statistics Canada data indicate that, for the period of 1996 to 2001, the cultivated area (all crops combined) treated with herbicides increased by 33%, indicating more widespread use on the territory, the herbicide pressure index for targeted crops (grains, corn, soybeans, apples and potatoes) decreased from 2.11 kg of active materials per hectare in 1997 to 1.46 kg in 1999, i.e. a 30.8% decrease, a large portion of which can doubtless be attributed to the Quebec pest management strategy. It is also interesting to note that herbicide sales decreased by over 448,000 kg of active ingredients, whereas cultivated areas of targeted crops increased by more than 45,000 ha for the same period.

Given the increase in cultivated areas dedicated to integrated pest management and the sustained efforts stemming from the agri-environmental support program for the pest management strategy, this trend should continue in 2000, 2001 and 2002. However, various factors influence the use of pesticides, and environmental monitoring by MENV indicates that herbicides are still being regularly detected in sampled waterways. This is evidence of the challenge involved in reducing the use of agricultural pesticides—a challenge that is still very pressing today.

In short, efforts in the area of integrated pest management and the reduction of pesticide use have increased. Accordingly, a large number of farmers, specifically the members of the agri-environmental advisory clubs, now use the various means at their



Photo: Luc Vallières, MAPAQ

disposal to fight crop pests. Various techniques have been used to replace or complement pesticide use. The agri-environmental support program for the pest management strategy has promoted good practices; this increased awareness of pesticide use must continue in order to reduce the risk pesticides pose to human health and the St. Lawrence ecosystems.

## Restoring the Boyer River

Forty years ago, the Boyer River was home to a rich, diversified aquatic life. Riverside inhabitants could swim and fish in the river. In addition, rainbow smelt spawned near the mouth of the river. In the 1960s, this fish gradually deserted its traditional spawning ground. Today, more than 10 species of fish have disappeared from the river. Its small watershed, where there are currently more than 275 farms, has undergone significant upheaval, which has considerably upset the balance of aquatic ecosystems.

The significant deterioration of the Boyer River justified the implementation of a pilot project during Phase II of the St. Lawrence Action Plan. Detailed agri-environmental diagnoses were conducted on the farms in the watershed. During Phase III, the Groupe d'intervention pour la restauration de la Boyer (GIRB) spurred farmers to action and found solutions to problems. Close to 110 farmers made use of the services of the agri-environmental advisory clubs, 96 of which are members in good standing. In fact, an increasing number of farmers expressed an interest in changing their farming practices. In addition, 170 farms acquired watertight storage facilities for manure and slurry. The adoption of good farming practices (tillage, windbreaks, conservation of a riverside buffer strip, limiting access of livestock to riverbanks, etc.) is highly encouraging, even though there is still a great deal of progress to be made in this regard.



Photo: Luc Vallières, MAPAQ

## Establishing a risk indicator for pollution by phosphorus of surface water

Phosphorus is a vital element in crop growth which, when present in excess in the soil, pollutes surface water. A better understanding of its migration in different types of soil and crops will lead to improved fertilization practices. Accordingly, the establishment of a risk indicator for phosphorus pollution of surface water, based on the properties of the soil in question, provides a better understanding of the eutrophication of waterways associated with the use of this fertilizer. This new indicator will be used to draw up effective fertilization recommendations, which take into account the risk of phosphorus pollution of surface water.

## Ensuring compliance with the Quebec Regulations Respecting the Reduction of Pollution from Agricultural Sources

The compliance of manure and slurry storage facilities was verified by MENV under the *Regulations Respecting the Reduction of Pollution from Agricultural Sources* from 1998 to 2002, and under the *Agricultural Operations Regulations* after 2002. During the St. Lawrence Vision 2000 Agreement, i.e. from 1998 to 2003, some 10,000 inspections and visits were made to various farms in the six targeted agricultural regions (Chaudière—Appalaches, Montreal—Laval—Lanaudière, Montérégie [east and west], Central Quebec and Eastern Townships). In these six regions, over 3,700 compliant storage facilities were built, greatly exceeding the target of 2,000. MAPAQ invested approximately \$146 million in the six regions under the Prime Vert [green subsidy] program.

## Biodiversity

It is a major challenge to fully understand the biodiversity of a territory as vast as that of the St. Lawrence and to ensure that its wildlife and plants are protected. Thirty-five species at risk have been identified from among the thousands of plant and animal species whose survival hinges on the St. Lawrence ecosystem. This is why conservation measures have been taken, aimed specifically at protecting their natural habitats, breeding and feeding grounds, and controlling invasive species. Another important challenge in the Biodiversity component involves evaluating the impacts of water level variations in the St. Lawrence River.

### Target Results

Contribute to safeguard 35 threatened species of fauna and flora.

Control the introduction of exotic species and limit the impacts of invasive species.

Protect 120,000 ha of natural habitats, including direct acquisition of 1,660 hectares.

Develop and implement seven management and conservation plans for sensitive habitats.

Educate and heighten public awareness on the ecological value of the St. Lawrence.

Develop structures and sites with ecological potential to promote public access to the St. Lawrence.

Assess impacts of water level variations due to climate change on the ecosystem and on the uses of the St. Lawrence.

Provide forecasts and analyses on the state of the St. Lawrence by implementing an integrated monitoring system.



Photo: Louis Gagnon

### Helping to save 35 species at risk

Several committees of experts drew up recovery plans for threatened species, with the encouragement of the St. Lawrence Vision 2000 Action Plan.

Twenty priority animal species were identified: one insect, six fish, one amphibian, one reptile, ten birds and one mammal. Twenty-eight priority plant species were identified. The challenge in preserving these species will consist in ensuring, through regulations, the acquisition of sites or the negotiation of agreements with owners, as well as the protection of established populations and their habitats.



Photo: Louis Bernatchez

## Priority Species

Animal Species	Plant Species
<p><b>Insect</b></p> <ol style="list-style-type: none"> <li>1. Maritime ringlet butterfly</li> </ol> <p><b>Fish</b></p> <ol style="list-style-type: none"> <li>2. Atlantic sturgeon</li> <li>3. American shad</li> <li>4. Copper redhorse</li> <li>5. Striped bass</li> <li>6. Channel darter</li> <li>7. River redhorse</li> </ol> <p><b>Amphibian</b></p> <ol style="list-style-type: none"> <li>8. Western chorus frog</li> </ol> <p><b>Reptile</b></p> <ol style="list-style-type: none"> <li>9. Spiny softshell turtle</li> </ol> <p><b>Birds</b></p> <ol style="list-style-type: none"> <li>10. Horned grebe</li> <li>11. Harlequin duck</li> <li>12. Barrow's goldeneye</li> <li>13. Bald eagle</li> <li>14. Peregrine falcon</li> <li>15. Yellow rail</li> <li>16. Piping plover</li> <li>17. Caspian tern</li> <li>18. Roseate tern</li> <li>19. Loggerhead shrike</li> </ol> <p><b>Mammal</b></p> <ol style="list-style-type: none"> <li>20. Beluga whale</li> </ol>	<ol style="list-style-type: none"> <li>1. Green dragon</li> <li>2. <i>Asclepias tuberosa</i></li> <li>3. Anticosti aster</li> <li>4. Gulf of St. Lawrence aster</li> <li>5. <i>Astragalus australis</i></li> <li>6. Fernald's milkvetch</li> <li>7. Connecticut beggarticks</li> <li>8. Handsome sedge</li> <li>9. False hop sedge</li> <li>10. Spotted water hemlock</li> <li>11. Meadow thistle</li> <li>12. Broom crowberry</li> <li>13. Flat-petal Lady's-slipper</li> <li>14. Sparrow's-egg Lady's-slipper</li> <li>15. Provancher's fleabane</li> <li>16. Parker's pipewort</li> <li>17. Dwarf huckleberry</li> <li>18. <i>Gentianella propinqua subsp. propinqua</i></li> <li>19. Macoun's fringed gentian</li> <li>20. Victorin's gentian</li> <li>21. American water-willow</li> <li>22. Sticky locoweed</li> <li>23. <i>Oxytropis deflexa var. foliolosa</i></li> <li>24. Alaska rein orchid</li> <li>25. <i>Rosa rooseauiorum</i></li> <li>26. <i>Rosa williamsii</i></li> <li>27. Lizard's tail</li> <li>28. Bog fern</li> </ol>

Among the species studied in these numerous research projects were the Atlantic sturgeon, beluga whale, copper redhorse and Barrow's Goldeneye.

Sixty-nine Atlantic sturgeons were tagged with miniature radio transmitters in order to track their movements. This allowed us to confirm the presence of spawners in the river, locate potential spawning grounds, and gain a better understanding of the Atlantic sturgeon's migrations between fresh water and salt water.

The St. Lawrence Beluga Recovery Plan, in association with the *Marine Activities in the Saguenay–St. Lawrence Marine Park Regulations*, provided an effective framework and facilitated the co-ordination of marine observation activities in the Marine Park.

Further to signing a \$1.8-million funding agreement with nine partners, Parks Canada built the Vianney Legendre fish pass. Located at the St. Ours Dam on the Richelieu River, it was built to allow five threatened species to once again travel to their upstream habitats: the lake sturgeon, American eel, American shad, river redhorse and copper redhorse. In 2001, after the fish pass was built, a five-year follow-up campaign was initiated, which has already catalogued 25 species, including the first copper redhorse in 2002.

Studies by Environment Canada on the Barrow's Goldeneye, a diving duck that overwinters in large numbers on the St. Lawrence, located this species' nesting grounds for the first time. It appears that this duck favours lakes with no fish populations

in inland areas on the North Shore of the St. Lawrence. This was corroborated by studies by the Société de la faune et des parcs du Québec (FAPAQ).

Moreover, various measures were taken to save priority species, including studies on the threats to species, the acquisition of knowledge, land preservation, establishment of conservation servitudes, and official site designation. Public awareness programs were also implemented to reduce the impacts of human activities. Moreover, the role of protected areas in preserving threatened species since the start of the St. Lawrence Action Plan was also evaluated.



Photo: Christian Marcotte



Photo: St. Lawrence Centre, EC

## Controlling exotic and invasive species

Other species are experiencing the opposite problem: they are overabundant. An inventory of exotic aquatic species in the St. Lawrence shows that one new species has appeared every year. These species can become invasive when there are no predators to limit their reproduction and they begin to compete with indigenous species. For example, the small zebra mussel, introduced by ships' ballast water, multiplies rapidly, blocking the St. Lawrence River's water supply system. The invasion of a waterway by the zebra mussel can completely alter its ecological balance and, in the relatively long term, lead to losses in the biodiversity of indigenous mussels. With research ongoing on this exotic species, the public is being informed about preventive measures to restrict the invasion (see the Navigation component).

In spring 2002, the Greater Snow Goose population along the St. Lawrence was evaluated at close to 650,000 birds. This large population is threatening the ecological balance of bulrush marshes, the species' traditional habitat, and the masses of geese on farmland bordering the river are causing significant crop depredation. The Greater Snow Goose Action Plan, implemented with partners, is aimed at reducing the species' impact on natural habitats and farmlands along the St. Lawrence. It includes preventive measures such as a spring conservation hunt to reduce the population and, in certain cases, compensation for farmers.

## Protecting 120,000 ha of natural habitat

The creation and enlargement of parks, ecological reserves and wildlife sanctuaries, as well as the establishment of regulatory measures and conservation agreements involving non-governmental organizations (NGOs), has resulted in the protection of over 104,650 ha of natural habitat, all of which are indicated on the map of key results.

Three Quebec provincial parks were created—Anticosti, Hautes Gorges de la Rivière Malbaie and De Plaisance, representing over 82,000 ha of protected habitat. Other natural habitats were protected by the creation of the Grande Rivière ecological reserve and the consolidation of the Mont St. Pierre and Des Grands Ormes ecological reserves, the creation of five wildlife sanctuaries (Rivière des Mille Îles, Îlet aux Alouettes, Pointe de l'Est, Île Laval and Pierre Étienne Fortin), and the addition of Île aux Perroquets to the territory of the Mingan Archipelago National Park Reserve.

In addition, some NGOs have acquired land. For example, by purchasing land on Lake Champlain and at Pointe du Gouvernement in the Haut Richelieu region, these NGOs enabled the protection of extremely rich habitats threatened by resort development. In total, 15 natural habitats were protected, either through acquisition or private land stewardship under projects funded by the Community Interaction Program.

Moreover, the DFO implemented a Marine Protected Areas (MPA) Program in Quebec further to the adoption of the Oceans Act in 1997. Accordingly, the project to establish an MPA on the Manicouagan Peninsula is aimed at specifically ensuring the conservation and protection of marine and estuary ecosystems with significant biodiversity and high biological productivity. A committee of local representatives drew up a management plan for the area that was subject to public consultation in 2001.

## Implementing management and conservation plans for sensitive habitats

Enhancement plans for the St. Maurice, Assomption, Fouquette and Ottawa rivers were drawn up. To implement them, a report on current knowledge was drawn up and the problems specific to each of the rivers defined. Subsequently, municipal, industrial and government decision-makers and citizens, formed round tables to find solutions to the problems. Finally, as a last step, funding will be solicited and partnerships established to take concrete action.

After adopting the action plan for the integrated management of the coastal zone between Les Escoumins and the Betsiamites River, measures were taken to, among other things, improve knowledge, increase public awareness of habitats, resources and uses, harmonize conflicting uses, and manage and enhance habitats and resources. Other integrated management committees were created, including five management committees in the Magdalen Islands (Grande Entrée and Havre aux Maisons lagoons, Baie du Havre aux Basques and Baie du Bassin, and Bassin aux Huîtres). In the Gaspé, the Gaspé and Cascapédia bays, the Bonaventure coast, and the Carleton barachois also have their own integrated management committees (see location of coastal habitats under integrated management on the map of key results).

## Raising public awareness and promoting access to the St. Lawrence River

Awareness activities and public access points enable the public to enjoy the ecological wealth and importance of the St. Lawrence River. Awareness and educational activities related to the St. Lawrence River have been integrated into interpretation programs in Canadian national parks in Quebec, Quebec provincial parks and even certain national wildlife areas.

Quebecers are gradually reclaiming the St. Lawrence, in particular by enjoying walks or bike rides along its banks. Thanks to financial support from the Access to the River program, some 10 municipalities have completed work on visitor facilities and access points to the St. Lawrence. For example, there is now a rest area on the banks of Lake St. Louis in Châteauguay, restored riverbanks, fishing spots and wildlife observation posts in Summerlea Park in Lachine, trails, benches and tables in the Léon Provancher marsh in Neuville, and parking lots close to migratory bird staging areas in Baie du Febvre.

Photo: Nelson Boissvert, Parks Canada



Also, the reopening of the Lachine Canal to pleasure boating in May 2002 was a resounding success, as indicated by the

4,715 pleasure craft that used the Canal in the first season. Before reopening, the Canal bottom was covered with a layer of contaminated sediment, the legacy of an industrial history of over 150 years. The sediment in the locks was removed, while the sediment up to 15 m on both sides of the lock gates was isolated under a geomembrane firmly secured to the Canal bottom. The environmental monitoring program set up during the season showed that the passage of boats did not stir up the sediment. Another effect of the restoration of the Lachine Canal has been the upsurge in local residential and commercial development thanks to major investments by the federal and municipal governments and the private sector.

Lastly, three wharf restoration projects were implemented as part of the program to dispose of surplus marine facilities by Public Works and Government Services Canada. The Grande Vallée wharf was restored and transferred to the municipality in November 2001. Two other projects, in Baie St. Paul and Bonaventure, are currently under way. By taking over these structures, municipalities help conserve local heritage sites and safely maintain these "gateways" to the river for citizens to enjoy.

## Evaluating the impacts of water level variations

Water level and flow in the St. Lawrence downstream from Montreal are currently controlled by the flow out of Lake Ontario and the Ottawa River, both of which are regulated for hydro-electric production, commercial navigation and flood control. Since the implementation of numerous antipollution measures, water quality in the St. Lawrence has significantly improved in recent decades. However, the lower precipitation and rising temperatures predicted in climate change scenarios for the Great Lakes–St. Lawrence basin would result in a significant drop in the volume of water flowing from Lake Ontario into the St. Lawrence.

Seasonal and annual variations in water level and flow in the St. Lawrence have a major impact on the natural ecosystems and the entire range of human activities that take place along its banks. Fluctuating water levels have an impact on the surface area, productivity and diversity of wetlands, which serve as habitat and a food base for a variety of large and small animals. The recruitment of fish species that spawn in the floodplain, such as pike, is linked to the size of spring floods. Flow conditions have an affect on the seasonal migration of fish between the freshwater portion of the river and the estuary. Numerous bird species use the marshes and swamps for nesting and feeding. Fluctuating water levels also have an impact on the distribution and abundance of exotic species and aquatic parasites.

The effects on the natural ecosystems aside, a large number of human activities are affected by fluctuations in the river's water level. For example, pleasure boating, and the use of marinas and launching ramps had to be modified during the periods of extremely low water levels in the summers of 1999 and 2001. The hydrodynamic modelling tools that have been developed are used to extrapolate scientific knowledge to the whole territory and assess the effects of various water level scenarios for the main course of the river.

The changing needs of user groups and the predicted impacts of climate change in the Great Lakes St. Lawrence basin prompted the International Joint Commission to reassess the current criteria for flow regulation to take into account environmental aspects and pleasure boating. The results of studies undertaken in Phase III of the Action Plan add to the quantitative knowledge collected on the impact of fluctuating water levels. This information is essential in achieving optimal management of the water in the basin based on the needs of both people and natural ecosystems.

## Implementing the State of the St. Lawrence Monitoring Program

The State of the St. Lawrence Monitoring Program was implemented based on a long-term perspective, the goal being to monitor changes in the River. Yet it is not easy to answer the question "Is the state of the St. Lawrence improving?", since the answer will vary depending on the location and environmental component considered. The St. Lawrence does not have one single barometer, hence the need for different physical, chemical and biological indicators. The selected indicators must also be quantifiable and allow comparisons between different times and in different places.

The four government partners in the State of the St. Lawrence Monitoring Program—Environment Canada, the Ministère de l'Environnement du Québec (MENV), Fisheries and Oceans Canada and the Société de la faune et des parcs du Québec (FAPAQ)—have agreed to pool results from a selected subset of scientific data collection, interpretation and dissemination activities. The Program's target clientele—government and municipal decision-makers, riverside communities, St. Lawrence users and environmental groups—have had the opportunity to express their opinions on the development of the Program and the possible contributions of new partners. The use of Program results should facilitate more informed decision-making and make it possible to adapt the public's perceptions to scientific reality. The targeted territory extends from the Quebec-Ontario border to the furthestmost Quebec border in the Gulf, but does not include the tributary rivers. Water volume and quality, river sediment quality, and the diversity and condition of biological resources are all characteristics that will be used to assess the state of and changes in the ecosystem. A set of fact sheets has been produced on the Program's 21 environmental monitoring activities. A summary of the conclusions on each fact sheet is presented in an overview of the state of the St. Lawrence River.

## State of the St. Lawrence Monitoring Program activities

Components	Monitoring Activities
<b>Water</b>	Hydrometric network (water level and flow) Toxic substances at the inlet (Wolfe Is.) and outlet (Lévis) of the fluvial section Organic toxic substances at the mouths of the Richelieu and Yamaska rivers Physical-chemical and bacteriological parameters of freshwater Physical-chemical parameters of water in the estuary and gulf Safety of shellfish waters in the estuary and gulf Safety of potential freshwater swimming areas
<b>Sediments</b>	Contamination of sediments in Lake St. Francis by toxic substances
<b>Biological resources</b>	Surface area of freshwater wetlands Invasive plant species in freshwater wetlands Monitoring of freshwater fish communities Contamination of freshwater fish by toxic substances Contamination of marine resources by toxic substances Phytoplankton communities in the estuary and gulf Zooplankton communities in the estuary and gulf Monitoring of toxic algae in the estuary and gulf Status of seabird populations Status of the Northern Gannet population Status of the Great Blue Heron population Status of the beluga whale population Reintroduction of striped bass

The set of selected data provides an overview of the state of the St. Lawrence, primarily in terms of water and biological resources. The data suggest that at the dawn of the 21st century, the St. Lawrence is in better condition than it was over the course of the second half of the 20th century. Contamination from toxic substances has dropped, and some animal populations have re-established themselves or are in the process of doing so. Marine organisms and freshwater fish are fit for consumption. At numerous locations, water quality is close to the level required for recreational use, although swimming is still not recommended in most of the St. Lawrence River. There is a good diversity in freshwater fish populations, and the St. Lawrence still has vast wetlands, which serve as habitats for the reproduction and feeding of a diverse and impressive number of wildlife species.

However, many problems persist. Bacteriological contamination still greatly restricts recreational use in the freshwater sections and shellfish harvesting in coastal marine waters. The toxic contaminants present in the sediment are a potential long-term threat for the St. Lawrence. Human activities, such as land use, exploitation of biological resources, disturbances, and the introduction of exotic species continue to have an impact on biodiversity. Lastly, the recovery of the beluga population is still far from certain, and will require many more years. Species are still vulnerable

to any stress (habitat loss, disturbances, contamination, etc.).



Photo: DFO

## Industrial and Urban

The industrial sector was already one of the environmental concerns included in Phase I of the St. Lawrence Action Plan in 1988.

At the time, various actions were defined, with the objective of having 50 priority major industrial plants reduce their toxic effluent into the St. Lawrence and, at the same time, the amount of waste produced, air emissions and repercussions of activities on the soil.

As a result of these actions, in 1995, there was already an overall reduction of 96% in the toxicity of effluents. In Phase II, 56 new plants located along the tributaries of the St. Lawrence were added to the program, for which 90% of the established release objectives were attained.

Over the course of Phase III, the focus was on industrial plants in the metallurgy, metal surface treatment and chemical sectors. A different approach was required, since these were all small and medium-sized enterprises (SMEs). Also, this sector brought a new issue into play—the toxicity of municipal effluent, pollution that is mostly attributable to SMEs that dump their effluent into municipal sewer systems.

### Target Results

Acquire and process information on the following industrial sectors : metallurgy, metal and chemical so as to give priority to interventions with respect to the 18 priority toxic substances.

Develop environmental management tools for the metallurgy, metal and chemical sectors.

Introduce preventive projects in 60 plants (20 per sector) and evaluate the environmental and economic gains.

Proceed to the control and inspection in the industrial sector.

Provide technical expertise and financial support to promote refinements, adaptation and commercialization of new technologies and facilities to prevent pollution.

Measure toxicity of effluents from three major metropolitan areas (Montreal Urban Community, Quebec Urban Community, Outaouais Urban Community) and nine other municipalities in order to support corrective measures.

Complete the reduction of toxic liquid effluents from 10 Phase II priority plants (90% or optimal reduction to achieve virtual elimination).

Introduce an environmental awards program for the industrial plants targeted under the first two phases of the St. Lawrence Action Plan.

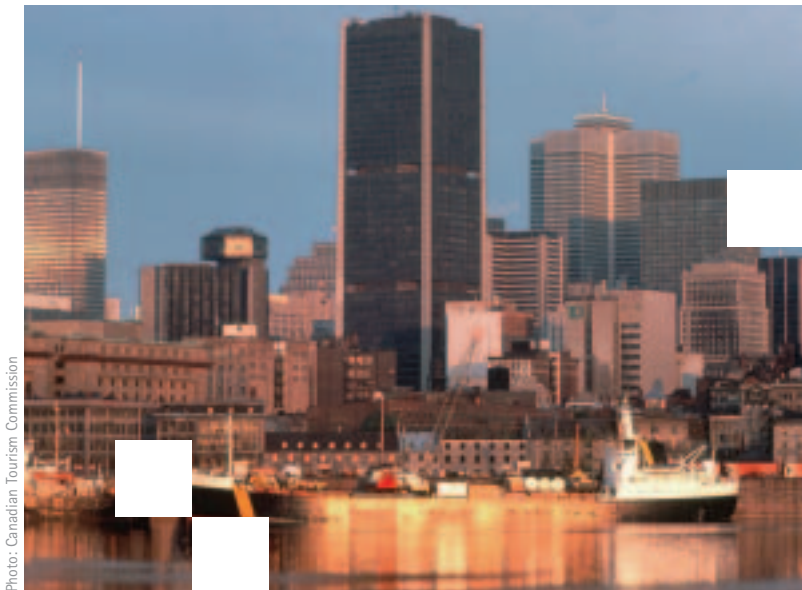


Photo: Canadian Tourism Commission

## Acquiring information on industrial sectors metallurgy, metal surface treatment and chemicals

During the two preceding phases, major industrial plants were required to implement more effective treatment systems with the goal of eliminating the pollutants generated by manufacturing processes and discharged into the St. Lawrence River. In Phase III, it was primarily SMEs that were targeted.

The 18 substances found in the river and considered to be priorities in St. Lawrence Vision 2000 (see table opposite) are deemed toxic under Canadian Environmental Protection Act. The three main industrial sectors that generate these toxic substances are the metallurgy, metal surface treatment and chemicals sectors, which in Quebec are mostly SMEs. An environmental and geographical profile has been compiled as well as the legal context governing these sectors.

Photo: Environment Canada

### The 18 Priority Toxic Substances in St. Lawrence Vision 2000

Ten Priority Substances identified at the start of Phase III in 1988	Eight Priority Substances added in 1999
Arsenic (As) Cadmium (C) Chromium (Cr) Copper (Cu) Mercury (Hg) Lead (Pb) Zinc (Zn) Polychlorinated biphenyls (PCBs) Dioxins and furans Polycyclic aromatic hydrocarbons (PAHs)	Acetaldehyde Formaldehyde 1,2-dichloroethane 1,3-butadiene Dichloromethane Hexachlorobenzene (HCB) Bis (2-ethylhexyl) phthalate (DEHP) Nickel (Ni)

## Developing environmental management tools

After the major corrective work accomplished at large industrial plants during the first two phases between 1988 and 1998, a different approach was adopted for SMEs. Emphasis was placed on pollution prevention, more specifically reduction at source, which requires the adoption of new processes, forms of energy or practices that prevent or minimize the production of pollutants and waste. These new methods involve changes that will likely reduce manufacturing costs, improve operating efficiency and reduce human and environmental health risks.

An inventory was made of environmental management tools, and a database created of the environmental diagnostic methods and training approaches used in the three industrial sectors in question. In collaboration with the metal surface treatment industry, work is currently under way to implement pollution prevention measures.

## Implementing pollution prevention projects in 60 plants

First, a pilot project was launched that made it possible to test the approach for implementing environmental diagnoses in two of the three target industrial sectors. Next, SMEs were recruited on a voluntary basis, although this proved more difficult than expected, since SMEs were reluctant to commit to the process. As a result, only 15 diagnoses could be completed, which required the project leaders to amend the initial recruiting approach.

It quickly became clear that focusing efforts on one specific geographical area would be more productive. Granby was selected, since a major program called the Granby Action Plan was simultaneously being started up by the City and the Ministère de l'Environnement du Québec (MENV). The goal of the Plan was to reduce the industrial and urban pressures resulting from the discharge of toxic effluent into the Yamaska River. Several factors played in favour of this Action Plan—the availability of data on the toxicity of effluent from the municipal treatment plant located on the Yamaska River, the ability to trace the source of toxic effluent discharged into the sewage system, the City's desire to limit the pollution load on its wastewater treatment plant and, lastly, the opportunity for the Local Development Centre to attract new companies that could use the treatment capacity freed up by these measures.

This turning point came when MENV's Montérégie regional directorate decided to implement a program which included conducting environmental compliance audits and reducing priority contaminants at several SMEs discharging their wastewater into Granby's municipal sewage system. This program provided for exhaustive inspections, characterization of effluent, and process analyses and diagnoses, all of which led to the search for solutions and follow-up with the plants. By supporting companies in their actions, the program made it possible to focus on the most serious sources of pollution and make companies more accountable for the toxic substances they discharge into the municipal system. In addition, the lessons learned could be applied to other municipalities. Some 40 plants were the focus of a preliminary initiative under the Granby Action Plan, which involved a tour of the plant and the presentation of program objectives.

Lastly, the monitoring and inspections done by MENV regional directorates in Quebec also helped to attain the prevention objectives set under St. Lawrence Vision 2000.

## Providing technical expertise and financial support for new technologies

Environment Canada and Canada Economic Development signed a Co-operation Agreement to pool their efforts and encourage the participation of local companies in federal programs and services that promote the design and marketing of innovative technologies, products and services, as well as sustainable development and better environmental and economic performance. Thanks to the IDEA—SME program resulting from the Agreement, it has been possible to provide scientific and technical guidance and more than \$8 million for SMEs interested in importing, designing and marketing new technologies.

## Measuring the toxicity of municipal effluent

This study, started in Phase II of St. Lawrence Vision 2000 and aimed at assessing the toxic potential of effluent from municipal treatment plants in Quebec, has been completed. The toxicity of effluent for aquatic life and the long-term toxic potential for the human food supply and fish populations were measured from a representative sample. The study was conducted in 3 major metropolitan areas—Montreal Urban Community (MUC), Quebec Urban Community (QUC) and Outaouais Urban Community (OUC)—and in 12 other municipalities selected on the basis of the various water treatment processes they use: Châteauguay, Cookshire, Farnham, Jonquière, La Prairie, Longueuil, Magog, Martinville, St. Gédéon ( Lake St. Jean Region), St. Joseph (Beauce), Sawyerville and Warwick (see map of key results). The majority of treatment plants comply with the wastewater requirements set by the MENV. However, these plants are unable to eliminate all toxic substances. Accordingly, in the future, efforts should be focused on reduction at source, specifically with respect to releases from SMEs, and on drafting solutions that enable a reduction in ammonia nitrogen outflow, which is often the source of pollution from aerated pond treatment plants.

It was also decided to examine effluents from the Granby municipal treatment plant following a MENV study on the Yamaska River, which showed that many toxic substances were present in higher concentrations downstream from the municipality than upstream. Based on this observation, the City of Granby became an ideal site for pollution prevention projects in the three priority industrial sectors.

Another study was conducted on effluent from the Chambly wastewater treatment plan as part of feasibility studies for the construction of a fish pass at the St. Ours dam.



Photo: Environment Canada

## Implementing an environmental awards program for industrial plants

The Public Awards Program for the 107 priority industrial plants targeted during the first two phases of the St. Lawrence Action Plan has been completed. Its goal was to acknowledge the role these plants played in attaining the toxic effluent reduction objectives and in virtually eliminating, over the long term, 11 persistent, bioaccumulative toxic substances. The companies were applauded for implementing clean-up measures for their effluent and making changes to their industrial processes. Certificates were awarded to 80 plants, while 11 others shut down and a further 16 did not meet their objectives.

## Navigation

For its earliest explorers and inhabitants, the St. Lawrence was the gateway to the heart of the continent. Navigation played a major role in settling the territory and trading with Europe. The building of ever larger ships and the race against the Americans for the best access to the Great Lakes led to a succession of projects that deepened and widened the river in places to facilitate passage of these new ships. Today, thousands of commercial ships from all over the world sail the St. Lawrence, and navigation is open year-round as far as Montreal. Ensuring the export and import of goods, these ships are an essential component of the country's economy.



Photo: Marc Piché

Nonetheless, there are some environmental impacts associated with this type of transportation. The safe passage of ships requires the maintenance of navigable shipping lanes of a minimum depth. This requires periodic dredging and the disposal of sediment to maintain the required depth. Dredging can also be necessary in ports and marinas to ensure access.

The environmental impacts of dredging are site-specific. The passage of ships and pleasure craft can also contribute to the erosion of riverbanks in sensitive locations. Other impacts from shipping activities include the introduction of non-native species through ship ballast water or wastewater discharge, and the risk of spills of hazardous materials. These activities must be closely followed to ensure the potential impact on ecosystems is minimized.

### Target Results

Develop and implement a navigation management strategy consistent with sustainable development on the St. Lawrence and in cooperation with the shipping industry, environmental interests, the governments and the public.

Establish a dredging mechanism to monitor activities on the St. Lawrence.

Produce or update tools to improve sediment management practices.

Implement a management plan for contaminated sites that may present a risk for the ecosystem.

Develop tools and manuals to improve the management of risks and environmental threats in a context of sustainable navigation on the St. Lawrence.

Protect the banks of the St. Lawrence against erosion caused by shipping and boating.

Introduce regulations or a code of good practice governing discharge of ballast water.

Environmental requirements must be reconciled with concerns for the safety of passengers and ships and economic constraints. Over 75% of the tonnage passing along the St. Lawrence comes from other countries, and the imposition of regulations specific to the St. Lawrence could potentially divert shipping to ports in the Maritimes and along the eastern U.S. seaboard. Accordingly, regulatory harmonization is crucial if we want to support the competitiveness of the port network.

Conversely, shipping has substantial environmental advantages over land transportation. Since ships are more energy efficient, they emit fewer atmospheric pollutants, specifically greenhouse gases. With the aim of attenuating environmental repercussions and enhancing the positive aspects of shipping, the Navigation Committee drew up a sustainable navigation strategy for the St. Lawrence River.

### Developing a sustainable navigation strategy for the St. Lawrence

Navigation is a new component in Phase III of St. Lawrence Vision 2000. The Navigation Committee comprises representatives from all areas covered by this issue. The Committee includes government representatives from Environment Canada, the Fisheries and Oceans Canada (DFO), Transport Canada, the Ministère des Transports du Québec, the Ministère de l'Environnement du Québec and the Société de la faune et des parcs du Québec. Ten non-governmental organizations also play an active role on the committee—the Montreal Port Authority, Les Amis de la vallée du Saint-Laurent, the St. Lawrence Ship Operators Association, the Corporation of Mid St. Lawrence Pilots Inc., the Fédération de voile du Québec [Quebec Sailing Federation], the Shipping Federation of Canada, the Canadian Coast Guard Auxiliary, the St. Lawrence Economic Development Council, the Société d'initiative et de conservation du Bas-Richelieu, and Stratégies Saint-Laurent. More than 20 individuals participated in discussions on selecting environmental issues, drafting a sustainable navigation strategy and deciding on methods for implementing the strategy.

The strategy, scheduled for publication in 2003, proposes the management of commercial shipping and pleasure boating activities and practices that is in line with environmental requirements, protection of the St. Lawrence ecosystems and development of other uses.

The various actions supporting the implementation of this strategy will be governed by guidelines and an application framework. These actions include drafting an integrated dredging and sediment management plan, preventing riverbank erosion from the effects of ship-generated waves, managing wastewater and cargo residues, assessing shipping adaptation options in the event of a drop in water levels on the St. Lawrence, increasing the collaboration of riverside communities in the case of a spill of hazardous materials, etc. Note that consensus building has been recognized as a major issue in implementing the strategy. These issues were defined by Committee members following sectoral consultations and surveys of the main parties involved in navigation on the St. Lawrence.

Various studies also facilitated the drafting of the strategy, including *The Environmental Risks and Impacts of Navigation on the St. Lawrence*, *Étude comparative des impacts environnementaux des modes de transport de marchandises dans l'axe du Saint-Laurent* and *Influence de la navigation commerciale et de plaisance sur l'érosion des rives du Saint-Laurent dans le tronçon Cornwall—Montmagny*.

### Implementing an integrated dredging and sediment management plan

The maintenance dredging activities required to ensure safe navigation on the St. Lawrence are the subject of constant scientific and environmental monitoring by government authorities. A set of environmental rules and assessments govern these activities, although their complexity sometimes complicates approval of the work. Accordingly, a working group was set up to draft an integrated dredging and sediment management plan, whose main objective is to improve and simplify the entire evaluation process. Some 15 recommendations have resulted from this work and will facilitate the management of dredging and sediment disposal activities on the St. Lawrence.

Various guides have been prepared, including an overview of sediment sampling and an exhaustive table of the environmental, social, economic and administrative aspects of dredging activities on the St. Lawrence River. In addition, scientific studies have been conducted on the impacts of sediment disposal.

The management of dredged sediments is a highly complex problem, since contaminants from industrial, port, municipal and agricultural activities intermingle with the minerals naturally present in the sediment. Studies are currently under way to review the quality assessment criteria for St. Lawrence sediments. The current Great Lakes criteria, based primarily on the diversity of benthic organisms, are used as a benchmark for dredging activities in the St. Lawrence. In early 2001, several sediment specialists were invited to a workshop at which they drafted the guidelines for reviewing the sediment quality assessment criteria.

### Ensuring monitoring and remediation of contaminated sites presenting a risk for the ecosystem

Numerous contaminated sites that could present risks for the ecosystem are located close to industrial or urban facilities. Two of these sites were a priority in Phase III: sector 103 of the Montreal port area and the mouth of the St. Louis River (see map of key results).

Sediment from the north and south bays of sector 103 of the Montreal port area (eastern edge) is highly contaminated with hydrocarbons and metals from storm drains and industrial waste. The Jacques Cartier Area of Prime Concern (ZIP) Committee has set up a working group to remediate the sediment. Thanks to this initiative, four partners have committed over \$5 million to the project—the Montreal Port Authority, Shell Canada, Imperial Oil and Noranda. The ZIP committee received scientific and financial support that enabled it to seek consultation on drafting scenarios, outlining the project and conducting the impact study on the project to remediate sector 103, one of the most contaminated aquatic sites in the St. Lawrence River.

The industries on the shores of the St. Louis River have been made aware of the contamination problem, and two sediment characterization studies at the mouth of the St. Louis River were conducted in co-operation with the Haut Saint-Laurent ZIP committee. The results of these studies encouraged Alcan Beauharnois and PPG Canada in the Beauharnois—Melocheville industrial park to commit additional funding to the remediation of contaminated sediments. Both companies are now the promoters of the project. The environmental impact study is over, and the environmental authorization process is now under way.

### Developing tools to improve environmental risk management

To ensure the adoption of appropriate intervention practices in at-risk situations and to promote prevention efforts, various management tools and forecasting models have been developed. A bioremediation pilot project of aquatic plants was conducted in partnership with French and U.S. scientists. They simulated a hydrocarbon spill on the banks of the St. Lawrence near St. Croix de Lotbinière and various bioremediation techniques were used for the clean-up. The results of this exercise inspired a number of scientific papers and an intervention guide and protocols adapted to certain areas of the St. Lawrence.

Water level prediction data were integrated into the Coastal and Ocean Water Level Information System (COWLIS). The use of this tool improves the safety of shipping and facilitates load planning for ships entering and leaving the St. Lawrence River. Note that one additional centimetre of water in the St. Lawrence allows a container ship to carry six more containers, at an average value of \$2,000 each. For bulk cargoes, the gain is assessed at approximately 60 tonnes, with the value varying with the type of cargo (grains, ores, etc.).

Lastly, the St. Lawrence Observatory portal ([www.osl.gc.ca](http://www.osl.gc.ca)) provides access to scientific data compiled by the Maurice Lamontagne Institute (DFO) on the St. Lawrence.

### Protecting the banks of the St. Lawrence against erosion caused by ship-generated waves

Bank erosion along the St. Lawrence is attributable to many natural factors, including the type of substrate (clay, sand, rock, etc.), fluctuating water levels, ice, wind waves and current. Ship-generated waves, and the wash from passing ships or boats (the size of which varies with speed and tonnage), can in certain cases erode the banks along the shipping lane.

A voluntary speed reduction measure for commercial ships was adopted in fall 2000 and applied in the 25-km Sorel—Varenes navigation corridor (see map of key results). This sector had previously been identified as particularly sensitive to erosion. The Canadian Coast Guard (DFO) monitors traffic, and recent data show an 80-90% rate of compliance with the measure.

Preliminary results suggest beneficial effects on the banks in this sector, but a more in-depth, long-term assessment will be necessary to provide confirmation. Note that adoption of this measure by commercial shippers involves economic and operational constraints (longer transit time).



Photo: Denis Lehoux, EC

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Pleasure boats can also contribute to bank erosion. To raise pleasure boaters' awareness of the problem, an interactive map has been produced that highlights erosion-sensitive areas between Cornwall and Quebec City, and can be accessed on the SLV 2000 Web site.

## Implementing new guidelines on ballast water discharge

The introduction of exotic aquatic species through ship ballast water is an international problem that has major consequences on ecosystems and the economy.

For example, the zebra mussel, suspected of being introduced through ship ballast water, is threatening the biodiversity of the St. Lawrence (see Biodiversity section) and causing damage estimated in the billions, particularly to municipal water systems.

Since September 2000, the *Guidelines for the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction* have applied throughout Canada. However,

ship captains comply with the proposed management methods on a voluntary basis. Only ships bound for the Great Lakes are subject to regulations that are enforced by U.S. authorities.

To harmonize with U.S. regulations and better protect the freshwater portion of the river, the Canadian Marine Advisory Council (CMAC) drew up draft regulations. A working group dedicated to this problem was set up at the initiative of Transport Canada to ensure that Quebec's interests are taken into account when regulations are drawn up in the future. A set of amendments to the draft regulations was tabled in May 2002, and they were favourably received by the CMAC.



# COMMUNICATIONS

During Phase III, the SLV 2000 partners regularly produced and disseminated documents on knowledge acquired on the state of the St. Lawrence and actions taken in the six components.

The St. Lawrence Vision 2000 Web site plays a crucial role in the dissemination of information. More than 900 products and services have been posted online—reports, studies, environmental assessments, press releases, annual reports, not to mention the 39 issues of the *Le Fleuve* newsletter. The number of hits has been rising since June 1998. According to recent statistics, over 19,000 people visit the site every month, with an average visit lasting 26 minutes. Also, according to a survey conducted as part of SLV 2000, the Internet is the main reference source for 41% of people looking for information on the state of the St. Lawrence.

With respect to more traditional communication methods, scientists, managers and media representatives were invited to many meetings and special events at which they were able to share information. One of these events was the launch of Phase III, which was attended by numerous guests and media representatives, thereby ensuring significant press coverage. A number of communication tools were prepared for the launch, including an information leaflet on the various aspects of the phase and a CD-ROM of the results of Phases I and II, both of which were widely disseminated during Phase III.

In brief, the promotion of results related to issues in each component, contributed to increase knowledge about the St. Lawrence and provided information on the efforts made to protect, conserve, clean up, restore and enhance this major resource.

## Community involvement

Among the major activities in this area, note the forum held in 2001 under the theme “The St. Lawrence River—in good hands,” which attracted more than 150 participants. The event promoted communication between the communities involved and showcased community commitment to the protection, conservation and enhancement of the St. Lawrence River. In 1999, a press conference was held to announce the Co-operation Agreement between SLV 2000 and Stratégies Saint-Laurent that established a framework under which the latter ensured consensus building between the ZIP committees. An information brochure on the ZIP program was produced and widely disseminated.

Press conferences were held to announce the tabling of six environmental reports, following which consultations were organized by the Area of Prime Concern (ZIP) committees in the following sectors: Varennes—Contrecoeur, Îles-de-la-Madeleine, Portneuf—St. Nicolas, Rive sud de l'estuaire moyen et de l'estuaire maritime du Saint-Laurent, Valleyfield—Beauharnois, and Trois-Rivières—Bécancour.

Lastly, various communication tools on the projects funded by the Community Interaction Program—leaflet, poster, press releases and fact sheets—conveyed to the target clientele and the public the commitment and energy of the riverside communities.



## Human health

Many information and awareness-raising activities on human health, and activities promoting the various uses of the St. Lawrence (consumption of fish/shellfish taken from the river) were organized for riverside inhabitants and users.

Posters on swimming and eating sport fish caught in the Greater Montreal area and summaries of numerous research studies, are available on the SLV 2000 Web site. The messages conveyed by the posters were copied onto postcards for distribution at the Biosphère and during trade fairs and exhibitions. In addition to information sessions given to Biosphère educators and the publication of numerous articles, many research subjects were covered in radio broadcasts.

A major awareness campaign on the risks associated with eating shellfish was launched at a spring 2000 press conference. This campaign was organized by the Rive nord de l'estuaire, Baie des Chaleurs and Îles de la Madeleine ZIP committees, in co-operation with the health care system.

To help decision-makers, a seminar on eating bivalve shellfish and the associated health risks was organized by the Co-operation Committee in June 2000. It also published the results of a study on the public health risks of the presence of cyanobacteria (blue-green algae) and microcystins in three southwest Quebec watersheds.

Lastly, many researchers used trade fairs and exhibitions as an opportunity to give mini-presentations on the results of their work on the consumption of sport fish and waterfowl, and on swimming.

## Agriculture

Numerous information and awareness-raising actions were instrumental in reducing the risks of pesticides on health and the environment. They were made possible through the Quebec pest management strategy agri-environmental support program. For example, a wide range of practical tools were made available to farmers, thereby enabling them to reduce the amount of pesticides used. Brochures, technical data sheets, videos, posters, etc. were just the start of a move toward integrated pest management. Material from workshops and demonstrations, which add to the significant amount of documentation already published, can be found on the pest management strategy Web site ([www.agr.gouv.qc.ca/dgpar/agroenv/slv-strategie.html](http://www.agr.gouv.qc.ca/dgpar/agroenv/slv-strategie.html)).



## Biodiversity

A variety of methods were used to convey information on current knowledge about biodiversity in the St. Lawrence. In 2000, the *Biodiversity Portrait of the St. Lawrence* also became available online. This summary



Photo: Gillo Lavoie, MENV

of knowledge acquired over the past 30 years is a valuable decision-making tool on the conservation of the river's resources.

The 2001 opening of the first multi-species fish pass on the Richelieu River received national media coverage and generated considerable interest.

The Rendez-vous Saint-Laurent forum, held on February 27, 2003, was another highlight in Phase III. It marked the launch of the State of the St. Lawrence Monitoring Program, a set of 16 fact sheets on the results of the indicators used in the Program, and the brochure entitled *Overview of the State of the St. Lawrence River*.

Added to these several highlights are the publication of plans for the re-establishment of species at risk and the distribution of several dozen reports and assessments on protected areas.

## Industrial and urban

Eighty awards certificates were presented to major industrial plants that reduced their discharge of toxic effluent into the St. Lawrence. Press releases were also issued to highlight the importance of the results obtained. Moreover, a leaflet was sent to small and medium-sized enterprises (SMEs) describing the IDEA-SME program, which offers scientific, technical and financial support to SMEs concerned about preventing pollution.

## Navigation

Various communication tools were designed, and the members of the Navigation Committee took part in numerous public events, including the biennial forum of the International Joint Commission held in October 2001.

In January 2000, the *St. Lawrence Observatory* portal of Fisheries and Oceans Canada was brought online. This internationally renowned site provides access to scientific data on the St. Lawrence Estuary, as well as the results of work and research on ocean sciences.

The *Towards Sustainable Navigation* leaflet was distributed to all the organizations and parties involved in the sustainable navigation strategy. An ad was also placed in the 2000-2001 edition of the *Montreal Port Guide* and the May 2000 edition of *Maritime Magazine*.



Photo: Société de sauvetage

Note also that sectoral meetings were held with some 60 representatives from the shipping industry, governments, pleasure boating organizations, environmental groups and riverside communities. These meetings enabled consultations between the parties concerned with the aim of defining a sustainable navigation strategy, its major guidelines and its issues.



# GOVERNMENT EXPENDITURES 1998-2003

The governments had planned to invest \$239 million over the five years of Phase III of the St. Lawrence Action Plan, i.e. \$123 million by the federal government and \$116 million by the Quebec government. However, the total amount spent during this phase, estimated at \$302.9 million largely exceeded the budget set at the start of the Plan. More specifically, the total expenditure by Quebec partners, assessed at \$185.2 million, is far higher than anticipated and can be explained in part by additional contributions granted to farms by the Ministère de l'Agriculture, des Pêcheries et de

l'Alimentation du Québec (MAPAQ) to enable compliance with the *Regulations Respecting the Reduction of Pollution from Agricultural Sources*. In addition, the Ministère des Transports du Québec joined the other partners in contributing to the Navigation component. The \$117.7 million difference between the set budget for the federal partners and their total expenditures can be explained by lower-than-expected expenditures by Health Canada, Parks Canada and Environment Canada.

## Government Expenditures 1998-2003

Government Partners	Components						Communications and Co-ordination	Total in thousands \$
	Community Involvement	Biodiversity	Human Health	Industrial and Urban	Navigation	Agriculture		
Environment Canada	12 970	19 723	3 868	6 746	3 986	3 084	4 703	55 080
Fisheries and Oceans Canada	1 062	9 075			4 082			14 219
Parks Canada		16 412						16 412
Canada Economic Development		13 726		8 375				22 101
Health Canada			5 180					5 125
Agriculture and Agri-Food Canada						1 000		1 000
Public Works and Government Services Canada		2 875			121			2 996
Transport Canada		165			512			677
<b>Total Canada in thousands \$</b>	<b>14 032</b>	<b>61 976</b>	<b>9 048</b>	<b>15 121</b>	<b>8 701</b>	<b>4 084</b>	<b>4 703</b>	<b>117 665</b>
Ministère de l'Environnement du Québec (MENV)*	1 637	2 564		16 252	398	15 075	1 151	37 077
Société de la faune et des parcs du Québec (FAPAQ)	1 585	3 547			202		189	5 523
Ministère de la Santé et des Services sociaux du Québec			2 626					2 626
Ministère des Transports du Québec					405			405
Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec						139 567		139 567
<b>Total Quebec in thousands \$</b>	<b>3 222</b>	<b>6 111</b>	<b>2 626</b>	<b>16 252</b>	<b>1 005</b>	<b>154 642</b>	<b>1 340</b>	<b>185 198</b>
<b>GRAND TOTAL in thousands \$</b>	<b>17 254</b>	<b>68 087</b>	<b>11 674</b>	<b>31 373</b>	<b>9 706</b>	<b>158 726</b>	<b>6 043</b>	<b>302 863</b>

\* In 1998, the expenditures related to wildlife projects were accounted for by the Ministère de l'Environnement et de la Faune du Québec (MEF), which was subsequently split into two entities—MENV and FAPAQ.



## SOCIO-ECONOMIC COST/BENEFIT ANALYSIS

Phase III of the St. Lawrence Vision 2000 Action Plan made great strides toward sustainable development. The major accomplishments during this phase include consolidation of the partnership between 13 federal and Quebec government departments, and the broadening of this partnership, which led to the participation of representatives from riverside communities and the private sector. Moreover, it was the quality of this co-operation that promoted the allocation of new funds, assessed at \$30 million, by both governments to continue the initiatives started during Phase II and implement new projects.

For the first time under the St. Lawrence Action Plan, the framework used for the socio-economic cost/benefit analysis of a phase was based on the principles of sustainable development. This means that, in addition to financial gains, the gains were assessed in terms of built capital, natural capital and human and social capital.

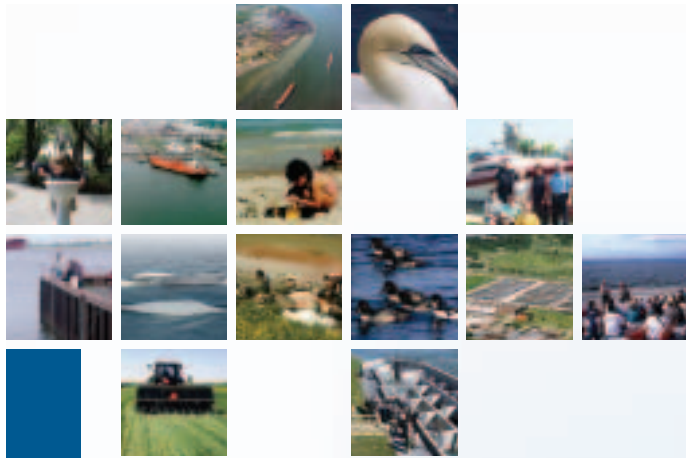
The gains in financial capital are the economic spinoffs from expenditures and the strengthening of permanent programs of partner departments and the leverage effect of funds obtained from other organizations and riverside communities. With respect to economic spin-offs, the \$256 million in expenditures committed under the Action Plan made it possible to maintain or create 3,719 direct and indirect jobs and increase the gross domestic product (GDP) by \$218 million. The newly injected funds (\$30 million) helped strengthen certain existing government programs on the basis of results targeted by the Action Plan. Accordingly, this investment generated a ninefold increase in funding support from permanent federal and Quebec government programs. The completion of community projects, investment by agricultural producers and commitments from industrial companies to clean up aquatic sites generated a leverage effect on the economy, which translated into financial capital assessed at \$23.9 million over five years.

The gains in built capital are the production methods (equipment and infrastructure) used to maintain or increase the production of goods and services. New manure and slurry storage facilities, public access to the river, the Vianney Legendre fish pass on the St. Ours Canal and the reopening of the Lachine Canal to pleasure boating, all represent components of built capital assessed at \$119.2 million over five years.

Natural capital is all aspects of water, air, soil and biodiversity. As part of the Action Plan, this capital comprises riverside environments along the St. Lawrence River and Gulf, the protection of natural habitat and species, and the maintenance of fishing activities. The gains in natural capital are assessed at \$220.7 million over five years.

Human and social capital is mostly associated with the development of people's abilities through education, acquisition of knowledge and community action. Examples in the Action Plan include the participation of members of the Areas of Prime Concern and the Biosphère's ObservAction Network, the volunteer actions of riverside communities, and tools for releasing information on the St. Lawrence (forums, Web site, publications). The gains in human and social capital are assessed at no less than \$5.7 million over five years.

As with the first two phases, the achievements in Phase III more than justify the investments made. The measurable financial benefits exceeded the total amount committed by the various partners, even considering depreciation in the value of money and other forms of public investment. The benefits examined in the analysis exceeded the total direct and indirect government expenditures by some 40%. The Phase III investments contributed to the sustainable development of the St. Lawrence, which is reflected in the socio-economic cost/benefit analysis in terms of the economy, society and the environment.



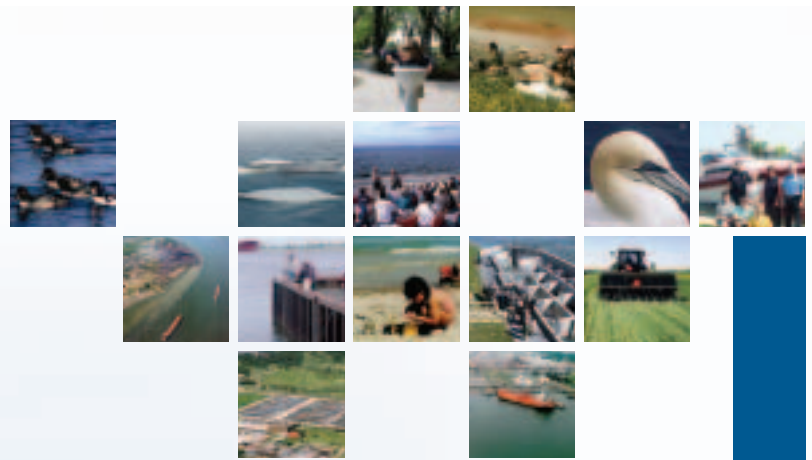
# Highlights from the past 15 years of the St. Lawrence Action Plan

## BIODIVERSITY AND CONSERVATION OF THE ST. LAWRENCE ECOSYSTEM

- Creation of the Saguenay–St. Lawrence Marine Park, the first park jointly managed by the federal and Quebec governments in close collaboration with the community (Phase II).
- Protection of 116,650 ha of natural habitat through the creation and enlargement of parks, ecological reserves and wildlife sanctuaries, and the establishment of regulatory measures and conservation agreements involving the participation of non-governmental organizations (Phases I, II and III).
- Adoption of protection measures for 20 priority animal species and 28 priority plant species, ranging from the acquisition of knowledge to the implementation of recovery plans (Phases I, II and III).
- Enhancement of a dozen sensitive areas through the creation of integrated coastal zone management committees in the Gaspé, Magdalen Islands and North Shore (Phase III).
- Construction of a multi-species fish pass at the St. Ours dam on the Richelieu River to re-establish free upstream passage of five threatened species (lake sturgeon, American eel, American shad, river herring and copper herring) (Phase III).
- Assessment of the repercussions of fluctuating water levels in the freshwater course of the St. Lawrence with a view to reassessing regulation criteria for Lake Ontario and the St. Lawrence River by the International Joint Commission (Phase III).

## CLEAN-UP, PROTECTION AND REMEDIATION OF THE ST. LAWRENCE

- Reduction of 96% in the toxicity of effluent discharged into the river by 50 of the most polluting industrial plants, the awarding of certificates to 80 plants that attained their toxic effluent reduction objective, and the virtual elimination of 11 persistent bioaccumulative toxic substances (Phases I, II and III).
- Measurement of the toxicity of effluent from treatment plants in some 15 municipalities (Phase III).
- Implementation of over 120 technological development projects in the area of industrial and municipal pollution clean-up since 1988 (Phases I, II and III) and 93 projects in the area of agricultural clean-up since 1998 (Phase III).
- Reduction in coliform, nitrogen and phosphorus pollution through the implementation of 3,770 watertight storage structures for manure and slurry in the main agricultural watersheds of the St. Lawrence (Phase III).
- Safe restoration and reopening of the Lachine Canal (Phases I, II and III).
- Characterization of 12 contaminated aquatic sites (Phase I), restoration of marine habitats, marshes and disturbed banks (Phase II), and development of restoration plans for sector 103 of the Montreal port area and the mouth of the St. Louis River (Phase III).
- Development of a sustainable navigation strategy focused on the management of commercial shipping and pleasure boating activities and practices consistent with environmental requirements, the protection of the St. Lawrence ecosystems and other uses (Phase III).



### ASSESSMENT OF THE STATE OF THE ECOSYSTEM AND DISSEMINATION OF KNOWLEDGE ON ENVIRONMENTAL PROBLEMS FOR DECISION-MAKING PURPOSES

- Publication of a state of the environment report on the St. Lawrence in 1996 (Phase I).
- Production of four fact sheets on environmental issues regarding agriculture, urban activities, water-level management and wildlife disturbance in the St. Lawrence (Phase II).
- Establishment of an overview of the state of the St. Lawrence based on 21 activities in the State of the St. Lawrence Monitoring Program (Phase III).
- Preparation of a mass balance study of contaminants in the St. Lawrence River (Phase II).
- Establishment of a biodiversity portrait of the St. Lawrence (Phase II).
- Production of 12 plates for an environmental atlas of the St. Lawrence covering its natural and human settings, uses and conservation (Phase II).
- Creation and bringing online of the *St. Lawrence Vision 2000* and *St. Lawrence Observatory* Web sites (Phases II and III).

### HUMAN HEALTH

- Launch of two major surveys, in 1995 and 2001, which made it possible to assess the behaviours and perceptions of riverside inhabitants with respect to uses of the St. Lawrence (Phases II and III).
- Implementation of some 50 pilot studies and epidemiological surveys on the health risks for riverside communities from exposure to various chemical and microbiological contaminants resulting from the consumption of drinking water or fish taken from the St. Lawrence or from recreational activities in the waters of the St. Lawrence (Phases II and III).

- Creation of partnerships with the ZIP committees for the implementation of awareness campaigns on the risks associated with recreational activities on the St. Lawrence and the consumption of shellfish harvested from the river (Phase III).
- Reduction of contaminants (PCBs, chlordanes, DDT, benzene hexachloride) by 30-70% in North Shore newborns since 1993 (Phases II and III).

### ST. LAWRENCE RIVERSIDE COMMUNITY INVOLVEMENT

- Creation of 14 Area of Prime Concern (ZIP) committees, each with its own environmental remedial action plan, and whose projects involved over 250 local and regional partners (Phases II and III).
- Implementation by community organizations of 235 projects (Community Interaction Program) aimed primarily at cleaning up and stabilizing the banks, managing wildlife habitat and enhancing access points to the St. Lawrence (Phases II and III).
- In each ZIP, dissemination of knowledge to the communities through the production of environmental assessment reports on biological, physical-chemical and socio-economic aspects, and on human health (Phases II and III).
- Holding a forum on community commitment that promoted better networking among community organizations (Phase III).
- Participation of 104 organizations in the Biosphère ObservAction Network, including schools, municipalities and non-governmental organizations (Phase III).



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