FIVE-YEAR REPORT

1993-1998

St. Lawrence Vision 2000

Canada

Québec

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MESSAGE FROM THE FEDERAL MINISTER OF THE ENVIRONMENT

I am especially proud to be able to present to you the summary report on the achievements of the St. Lawrence Vision 2000 Action Plan. Like me, you will be heartened to see the major environmental gains that have been made, especially in reducing releases of industrial toxics and in protecting habitats and threatened species. While we have not finished the job of restoring the St. Lawrence, these results nevertheless justify the conclusion that the river and its wildlife are now in better shape. These are very encouraging results.

The second phase of the St. Lawrence Action Plan which began in 1993, has enabled the governments involved to diversify their activities using a more global approach which focuses on prevention. Major breakthroughs have been achieved in understanding, among other things, the health risks for people living along the river and its users. We now know a lot more than we did about the condition of the St. Lawrence and its tributaries.

Substantial efforts have been made to disseminate this knowledge to concerned communities, to help them make decisions and to give us all a better idea of the action required. I am particularly pleased with the work done by Stratégies Saint-Laurent and the citizen involvement in areas of prime concern (the ZIP committees). This work has established the groundwork for greater participation by river communities in restoring and enhancing this great waterway.

Community action to protect and preserve our major ecosystems is the approach of the future. Sustainable development is only achieved with the participation of members of the public in the decisions that affect them. As you peruse this summary report, you will appreciate the economic impact of such plans as St. Lawrence Vision 2000 and the major benefits not only for communities today, but also for future generations.

Finally, one of the great successes of this plan is the concerted effort made by federal and provincial government departments which, for the last ten years, have pooled their efforts and resources to achieve concrete measurable results. This harmonization of our activities is a unique management model. I would therefore like to thank them and also all those, both individuals and organizations, who have been our faithful companions since 1988 in this major project of preserving the St. Lawrence.

Christine S. Stewart

MESSAGE FROM THE MINISTER OF THE MINISTÈRE DE L'ENVIRONNEMENT ET DE LA FAUNE DU QUÉBEC

As Québec Minister of Ministère de l'Environnement et de la Faune, responsible for the St. Lawrence Vision 2000 Agreement (SLV 2000) on behalf of the Québec government, I am pleased to submit this five-year report. The work carried out under this agreement between 1993 and 1998 attests to the results of 10 years of harmonization and co-operation. Following up on the St. Lawrence Action Plan (SLAP), the recently completed SLV 2000 has been marked by concrete accomplishments in protecting and conserving the unique natural heritage of the St. Lawrence River.

Among the most convincing results, I am proud to point to the appreciable decrease in the liquid toxic effluent discharged into the river, particularly the 96 percent reduction in effluent from SLAP's 50 priority industries; the protection of 7 000 hectares of wildlife habitat; the preservation of threatened species, including the beluga, and the dissemination of the results of a number of studies on the St. Lawrence ecosystem. It is also important to mention the role assigned by SLV 2000 to riverside residents, who were able to act as key players in innovative community projects.

In closing, I would like to state that those who shaped SLV 2000 have helped to create a viable ecological future for generations to come. The river, which plays a leading role in the economic and social development of Québec and in which we take great pride, must be protected and conserved, and it is only through the co-operation of everyone concerned that this can be accomplished.

Paul Bégin

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A WORD FROM THE CO-PRESIDENTS OF THE AGREEMENT

St. Lawrence Vision 2000 (SLV 2000), the second harmonization agreement on conservation and protection of the St. Lawrence ecosystem, was signed in 1993 and ended in March 1998. It continued the joint activities begun in 1998 under the St. Lawrence Action Plan (SLAP).

It is with a great deal of satisfaction that we submit this five-year report, which describes the major accomplishments of those five years of joint effort to enable citizens to use the river once again in the context of sustainable development. SLV 2000 has involved greater consolidation of scientific knowledge and action, and its results, added to those of SLAP, are the fruit of a 10-year partnership.

While continuing the work begun under SLAP, St. Lawrence Vision 2000 focused on seven areas of activity to conserve the ecosystem and prevent pollution. This approach fostered a better understanding of the state of the St. Lawrence and a greater commitment on the part of the public, which played a concrete role in projects to conserve and enhance the river.

The St. Lawrence cannot be protected unless industrial pollution is eliminated. Action was therefore taken in 106 industrial plants that is, 56 new establishments in addition to the 50 already targeted under SLAP. In the 50 SLAP plants, we found a 96 percent reduction in the amount of liquid toxic effluent discharged into the St. Lawrence. Other environmental improvements were also recorded. Nearly 7 000 hectares of wildlife habitat were protected in order to maintain species diversity. Thirty-four maintenance and recovery plans for threatened species were drawn up and 27 of them implemented, and efforts to recover the St. Lawrence beluga continued.

Scientific research resulted in a better understanding of the state of the St. Lawrence and allowed for increased public knowledge and awareness. Among the many accomplishments, we would mention the dissemination of three synthesis reports on the state of the St. Lawrence, two reports on the water quality of a number of tributaries and environmental and health reports for each of the areas of prime concern (ZIPs). This information guided riverside communities in setting their action priorities. These communities, through their participation in ZIP committee activities, displayed both the desire and the ability to help improve the riverside environment.

Despite these numerous results and remarkable progress, a great deal of work must still be accomplished to complete the task of returning the St. Lawrence to the people. Brainstorming sessions have been held on continuing the work that has begun. All the partners concerned with protecting and conserving the St. Lawrence have already started to draw up a third action plan. We would like to take this opportunity to thank everyone who contributed to the success of SLV 2000. We are certain that, without their co-operation, we would never have been able to achieve such positive results.

Jean-Pierre Gauthier
Director General
Québec Region
Environment Canada

George Arsenault
Sous-ministre adjoint
Direction générale du patrimoine
faunique et naturel
Ministère de l'Environnement
et de la Faune du Québec

THE ST. LAWRENCE VISION 2000 ACTION PLAN

The Ecosystem Approach

The St. Lawrence Vision 2000 (SLV 2000) action plan was developed on the basis of an ecosystem approach that aims at tackling issues in a comprehensive and integrated manner. SLV 2000 deals with the St. Lawrence, the environmental condition of its tributaries and their effects on the ecosystem. Action focuses specifically on the following seven rivers: L'Assomption, oyer, Chaudière, Richelieu, Saguenay, Saint-Maurice and Yamaska.

Areas of Action

SLV 2000 includes seven major components, each oriented towards the sustainable development of the St. Lawrence River. Five of these components centre on ecosystem conservation and pollution prevention, while the other two focus on environmental protection and restoration.

The main objective of the **Biodiversity** component is to conserve and restore habitats and promote the recovery of threatened or declining species, particularly the St. Lawrence beluga. It is also concerned with painting an overall picture of the biodiversity in the St. Lawrence. The **Agriculture** component seeks to establish the effects of agricultural pollution on the St. Lawrence ecosystem. The **Community Involvement** component promotes the active participation of riverside residents in the protection and restoration of the St. Lawrence. Under the **Decision Support** component, scientific and applied research activities are carried out with a view to better understanding the St. Lawrence ecosystem and sharing this information with decision-makers and the general public. The aim of the **Health** component is to safeguard the health of riverside communities. The goal of the **Protection** component is to reduce the discharge of liquid toxic effluent and virtually eliminate discharges of toxic, persistent and bioaccumulative substances. Finally, the **Restoration** component is experimenting with and demonstrating new restoration technologies.

Government Partners

In order to become more efficient in their efforts to clean up and protect the St. Lawrence, Canada and Québec have agreed to join forces. A large number of government departments are participating in the implementation of SLV 2000. At the federal level, Environment Canada, Oceans and Fisheries Canada, Health Canada, Food and Agri-Food Canada, Canadian Heritage and the Federal Office of Regional Development are taking part. At the provincial level, the Ministère de l'Environnement et de la Faune, the Ministère de la Santé et des Services sociaux, the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation are actively involved.

Non-Government Partners

To better achieve its objectives, SLV 2000 encourages the co-operation and active participation of partners from the private sector, universities, environmental groups, research centres and such local organizations as Stratégies Saint-Laurent. This non-profit non-government agency has as its mandate to rally riverside communities and encourage them to work together to develop concrete measures to protect, restore and enhance the St. Lawrence and its tributaries.

The Importance of Harmonization

Such a broad range of initiatives requires the participation of a number of federal and provincial government departments concerned with protecting and conserving the St. Lawrence ecosystem. In an effort to simplify the management of these initiatives and to ensure that all objectives are fully achieved, a harmonization and co-ordination framework was established.

An agreement management committee made up of representatives from signatory federal and provincial government departments meets regularly to establish major guidelines and to monitor the implementation of each component of the agreement.

Harmonization committees for each component meet regularly to plan and monitor the implementation of activities in their area of concern. A committee responsible for communications also participates. Since the **Restoration** component is entirely a federal government responsibility, no harmonization committee was created.

The Advisory Committee

The federal and provincial ministers of the environment appointed Harvey Mead president of the SLV 2000 advisory committee. The committee was formed in the spring of 1996 in order to ensure that the concerns and views of the Québec public were taken into account when implementing SLV 2000.

The committee's mandate is to provide advice on the strategies, approaches and relations to be developed among the various partners, to comment on the results achieved, to share any public concerns and, finally, to suggest future initiatives. The advisory committee has offered advice on the various aspects of the action plan and has participated in its third phase of development.

BIODIVERSITY

The Protection of 7000 Hectares of Habitat

As of February 10, 1998, 6 738 hectares had been protected, that is, nearly 96 percent of the overall objective, and efforts under way reveal that the objective of 7000 hectares will likely be achieved. As a result, it has been possible to set up three new ecological reserves, to consolidate the national wildlife areas and to protect major waterfowl habitats, spawning sites for fish and areas of major importance for floral life.

A Commitment to Maintaining or Recovering 12 Threatened or Declining Species

The targeted objective was to help maintain or recover 12 species that were threatened or in decline. At the program's outset, a list of 155 priority species whose populations were seriously threatened or declining in the St. Lawrence corridor was drawn up. This list, which does not take account of invertebrates or non-vascular plants, includes 110 plant, 14 fish, 1 amphibian, 6 reptile, 19 bird and 5 mammal species. Activities aimed at acquiring knowledge were carried out for more than 60 species, most of which were species of flora. Under the Québec system for designating species as threatened or vulnerable, 35 species were the subject of a status report, while a plant species *(Griscom arnica)* received an official designation. Furthermore, recovery plans for 34 species were developed and 27 plans were implemented, far surpassing the initial objectives.

The piping plover is among the species of fauna that have benefited the most from the agreement. Thanks to public awareness initiatives and action taken to protect the species in its reproductive habitat, disturbances were reduced and the Québec population of piping plovers increased by 40 percent, to reach 100 individuals. Information about the habitat of the yellow rail revealed the importance of certain wetlands in the St. Lawrence estuary for ensuring the survival of the species.

The copper redhorse was the subject of efforts aimed at improving the reproduction of the species in its natural habitat and developing methods of raising both young and adult fish in captivity. The population of spiny softshell turtles of the Richelieu and Lac Champlain were monitored and sites needed for species maintenance were identified.

Among the many initiatives taken for priority plant species, it is important to mention the green dragon, which is limited to the river segment of the St. Lawrence. Studies conducted on this plant have made it possible to better understand its distribution and to make recovery plans in certain areas. Endemic and disjunct plant popula-

TARGET RESULTS
for March 31,1998

Protect 7,000 hectares of habitat.

Increase productivity of five disturbed marine habitats.

Establish a plan to conserve, restore and enhance coastal areas.

Carry on the recovery plan for the St. Lawrence beluga.

Help maintain or restore 12 species that are threatened or in decline.

Restore the smelt population in rivière Boyer.

Publish a report on St. Lawrence biodiversity.

Establish a network to monitor the condition of the River.

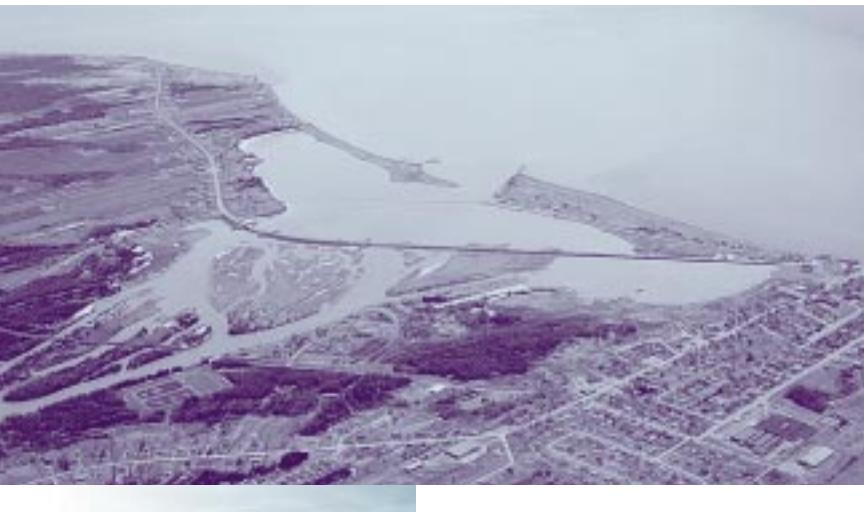


Photo: Barachois de Bonaventure.
Denis Chamard,
Fisheries and Oceans Canada

tions were protected, particularly in such important areas as Mont-Saint-Pierre and the St. Lawrence estuary.

Pursuing the Recovery Plan for the St. Lawrence Beluga

SLV 2000 partners have pursued efforts made under the St. Lawrence Action Plan (SLAP) to bring about the recovery of the St. Lawrence beluga by joining forces with outside participants. An agreement with the World Wildlife Fund (WWF) has allowed for the development of a recovery plan, made public in February 1996, with the help of a team of government and non-government experts.

This plan is the first of its kind to be developed for a marine species in Canada. It contains various recommendations for reducing pollution, controlling disturbances, adopting preventive measures and monitoring the precarious situation of the beluga. SLV 2000 partners, often in conjunction with outside participants, ensured that several of these recommendations were implemented, in accordance with the beluga recovery plan announced in July 1996. A committee responsible for following up, promoting and assessing the implementation of the plan was also created and is preparing its first public report on efforts related to the recovery plan.

Restoring the Rainbow Smelt Population in Rivière Boyer

The achievement of this result was based on successfully improving water quality by reducing organic inputs and sedimentation resulting from soil erosion.

A training and awareness program for farmers has led to such changes in agricultural practices as the creation of farm plans, improvements in equipment, the installation of water troughs to prevent livestock from trampling riverbanks and the planting of strips of vegetation along the shoreline. Experiments involving the development of techniques for incubating smelt eggs in the species' natural habitat have proven successful.

Finally, a plan involving the integrated management of sustainable resources and agriculture was developed to correct certain problems. The plan was submitted for public consultation to the stakeholders of the rivière oyer drainage basin.

Although significant progress has been made, efforts must continue beyond SLV 2000 to enable the rainbow smelt to spawn once again in rivière oyer.

Increasing the Productivity of Five Disturbed Marine Habitats

In 1993-1994, five disturbed marine habitats were to be restored and enhanced. They were the barachois de Grand Pabos (Chandler), the barachois de Malbaie (south of Gaspé), the barachois de onaventure, the lagune de Havre aux asques (Îles-de-la-Madeleine) and the marais de Pointe-aux-Outardes (near aie-Comeau). Site characterization studies have made it possible to pinpoint the problems specific to each habitat: the dumping of municipal and industrial waste water constitutes a major problem for the barachois de Grand Pabos and the barachois de Malbaie and road construction has isolated the once marine basins in the barachois de onaventure and the lagune de Havre aux asques. The marais de Pointe-aux-Outardes is still considered a healthy habitat.

Later initiatives focused on the development of recovery plans. Efforts to reopen an isolated basin of the barachois de onaventure were made in 1995-1996. The cost of restoring the lagune de Havre aux asques is estimated at $6 million, an amount that has yet to be secured for the project. The dumping of waste water has almost stopped in the barachois de Grand Pabos since 1996 and the barachois de Malbaie is currently the subject of a privately administered conservation project. An environmental assessment was done in onaventure in 1996. Another was begun in Grand Pabos to study the recovery in the area once the dumping had stopped.

Those responsible for the **Biodiversity** component have extended their efforts to other disturbed habitats. Site characterization studies were done and recovery plans developed for the New Richmond, New Carlisle and Paspébiac barachois, the marais de Rivière-du-Loup and baie des Écorces in aie-Comeau. In 1997-1998, initiatives were undertaken to enhance baie des Écorces and the barachois de Paspébiac.

Portrait of St. Lawrence Biodiversity

In the last three years of the SLV 2000 action plan, the *Portrait de la biodiversité du Saint-Laurent* team developed a central Geographical Information System (GIS), which provided a collection of uniform geographical data on aquatic and terrestrial animal and plant species and their support structures (land space, bodies of water and climate) in the Québec portion of the St. Lawrence.

In concrete terms, the *Portrait de la biodiversité du Saint-Laurent* project made it possible to create a database composed of one element that describes the environment and its condition and another that describes the current knowledge of St. Lawrence life-forms. The collection of GIS data is used to describe inland, coastal and marine environments associated with the St. Lawrence system and makes it possible to study the environmental ecological diversity, the existing biodiversity and the relationships between human pressures and biodiversity.

The *Atlas de la biodiversité du Saint-Laurent* and the GIS platform were developed as part of this interdisciplinary project. They provide easy access to information on the localization and interest of the main poles of biological diversity, as determined in the data that has been collected on the St. Lawrence up to now. Furthermore, in the near future, the *Portrait de la biodiversité du Saint-Laurent* will make it possible to begin conservation, restoration and protection initiatives currently considered the most urgent and appropriate.

Furthermore, computer resources and newly acquired knowledge, as well as the publications and web sites that will result from this project in the medium term, should provide decision-makers and the general public with the information needed to draw up guidelines and plan future initiatives involving the integrated management of resources and the sustainable use of St. Lawrence species and ecosystems.

Coastal Regions

Since 1993, Fisheries and Oceans Canada has been working on developing an information system for fish habitat management (ISFHM). The system provides spatiotemporal information on resources, habitats and human factors for the entire St. Lawrence marine system (the middle estuary, the maritime estuary, the Gulf of St. Lawrence and baie de Chaleur) and Northern Québec. This system is essential for ensuring the protection of the fish habitat and the development of plans for conserving, restoring and enhancing St. Lawrence coastal habitats. Sensitivity indices are currently being developed to better identify areas that are more likely to

be devastated by an oil spill. The ISFHM will also play a useful role in the development of integrated management plans for the coastal region in the new Oceans Act.

REPORT ON HABITAT CONSERVATION (February 10, 1998)

Sites	Protected Area
1994-1998	
Lac Saint-Francois	90.24
Îles Avelle, Wight et Hiam	62.28
Pointes Hébert et Goyette	27.86
Ruisseau Saint-Jean	77.37
Île aux Hérons	31.60
Île des Juifs	10.57
Rivière-aux- rochets	133.44
Tourbière de Lanoraie	97.56
Grande-Île	14.00
Île de Grâce	212.78
Île Lapierre	107.23
Îlets Percés / Île aux Raisins	8.53
Îles Millette et Straham	13.70
aie de Lavallière	21.88
Île Soyez	13.50
Île aux cochons	39.50
Île Saint-Jean	0.68
Lac Saint-Paul (Léon-Provancher)	40.00
Pointe-Platon	60.00
Ste-Anne-de-la-Pérade	42.00
aie Saint-Augustin	23.64
Cap Tourmente	7.78
Grands-Ormes	705.00
Kamouraska	11.72
Saint-André de Kamouraska	15.01
attures de l'île aux Lièvres	287.17
Îles de l'estuaire	316.10
Îsle-Verte	32.58
Mont Saint-Pierre	555.00
arachois de Malbaie	12.73
arachois de onaventure	7.49
Grand lac Salé	2339.00
Pointe Heath	995.00
Pointe de l'Est	325.91
Total (34 sites)	**6738.85 hectares**

AGRICULTURE

TARGET RESULTS
for March 31,1998:

- Publish a layman's brochure on the agro-environmental issue and possible solutions.
- Support four pilot projects initiated by the local community and assess their feasibility for the entire drainage basin.
- Produce a report on the presence of pesticides in drainage basin waterways.
- Produce a report on the use of pesticides and fertilizers and on farming practices.
- Publish an agro-environmental assessment for each drainage basin, including the state of water quality, contamination sources and agricultural clean-up activities to date.
- Publish an agricultural clean-up action plan for each of the four basins.

The **Agriculture** component was aimed at reducing pollution from agricultural sources and recovering water that can no longer be used by the population because of poor water quality. The component focuses particularly on four priority drainage basins, namely those of the L'Assomption, oyer, Chaudière and Yamaska rivers.

The main objective of the component is to make the key players aware of environmental problems related to agriculture and of possible solutions. A second objective is to support and assess the initiatives taken by local partners and to propose an action plan to extend the agricultural clean-up to all four drainage basins targeted by this component. Various activities were carried out under the **Agriculture** component in an effort to achieve these objectives.

Publishing a Brochure on the Agro-environmental Issue and Possible Solutions

A brochure entitled *Pour une eau de qualité en milieu rural – comprendre et agir collectivement* addresses the general concepts of surface water and groundwater quality and pollution. It also discusses the environmental impact of certain farming practices and the risks associated with the use of fertilizers and pesticides. The document suggests preventive and corrective measures that can be applied to farming.

Study on the Presence of Pesticides in the Waterways of Priority Drainage Basins

In order to complete the information available on pesticide-contaminated water, an environmental assessment of pesticides was done on certain waterways of the priority drainage basins. While the impact of corn farming on several waterways was already known, this sampling program made it possible to document the impact of pesticides used on other types of crops in the priority basins—specifically grains (wheat, barley and oats) and vegetables—on the water quality in the drainage basins. The waterways that were studied are the rivière David and ruisseau Corbin (in the rivière Yamaska drainage basin), ruisseau Saint-Pierre and rivière de L'Achigan (rivière L'Assomption) and rivière eaurivage (rivière Chaudière). The results of the analysis are contained in a report produced by the Direction des écosystèmes aquatiques du Ministère de l'Environnement et de la Faune du Québec.

Survey on the Use of Fertilizers and Plant Protectants

The partners of the **Agriculture** component participated in a survey of farmers conducted by the ureau de la Statistique du Québec. This survey provided detailed information on the use of pesticides and fertilizers (solid and liquid manure and inorganic fer-

Photo: Rivière Yamaska.
Michel Bouliane

tilizers) for agricultural purposes, especially in the four basins targeted by the **Agriculture** component. Part of the information is integrated into agro-environmental assessments.

Agro-environmental Assessments of Drainage Basins

In order to pinpoint the environmental problems related to farming activities, an agro-environmental assessment was done for each of the four designated drainage basins. The assessments describe and quantify the pressures exerted on the land by farming in relation to municipal and industrial pressures. The assessments reveal the quality of the surface water and groundwater and discuss and assess clean-up initiatives already undertaken in the area, with a view to reducing the environmental impact of human activity on the water.

These assessments, available in four reports, provide local partners, non-government organizations and citizens' groups with information that supports their desire to restore their river. The assessments are accompanied by popularized brochures that are designed to make the general public and key players aware of water pollution resulting from farming practices.

Support and Follow-Up of Four Pilot Projects

The **Agriculture** component also had as a mandate to participate in the technical monitoring, support and evaluation of four environmental pilot projects. These pilot projects were carried out by local organizations for each of the four drainage basins.

Two of these experiments involving the clean-up and management of water were begun under the Green Plan, one on ruisseau Turmel (rivière Chaudière basin), the other on ruisseau Saint-Esprit (rivière L'Assomption basin). During these projects, which were carried out from 1994 to 1997, such agro-environmental initiatives as building structures for the storage of solid and liquid manure, developing fertilizing plans and implementing conservation practices, were carried out and their effects on the water quality of brooks were determined.

The two other projects were carried out on ruisseau Corbin (rivière Yamaska basin) and on a part of the rivière oyer basin. The first project focused on heightening farmers' awareness, while the rivière oyer project involved detailed agro-environmental assessments of farms.

The Action Plan for the Agriculture of Each of the Four Drainage Basins

The last activity of the SLV 2000 **Agriculture** component consists of action plans to extend the agricultural clean-up to all four drainage basins. These action plans are based on agro-environmental assessments, acquired knowledge and available documentation. Furthermore, a theme day made it possible for key players to draw from the practical experience that they had acquired throughout the four pilot projects. Initiatives made it possible to develop a clean-up process adapted to the agro-environmental issues and to the socio-economic reality of the four drainage basins targeted by the component.

COMMUNITY INVOLVEMENT

Context

From the outset of SLV 2000, riverside communities and organizations concerned with protecting their environment were consulted about the implementation of the second phase of the action plan. The **Community Involvement** component includes the ZIP (areas of prime concern) program and the Community Interaction program.

The ZIP Program

The aim of the ZIP program is to encourage and support the participation of people from each of the targeted areas of prime concern. It focuses on 20 main areas. Government partners of SLV 2000 agreed to produce and issue an environmental report on the state of their area of concern to each of the ZIP committees. On the basis of this report, the population of each area was invited by the ZIP committee to help prepare and implement an Ecological Remedial Action Plan (ERAP). The ten existing ZIP committees receive support from Stratégies Saint-Laurent, a non-government organization that co-ordinates the program for the entire St. Lawrence.

Since the action plan was introduced, 13 series of reports covering the priority areas under SLV 2000 have been produced. The ZIP committees for the Haut-Saint-Laurent, Ville-Marie, Montréal East, the city of Québec, Saguenay, Alma-Jonquière, aie-Comeau, aie-des-Chaleurs and the Côte-Nord of the Gulf of St. Lawrence have all received regional reports and synopses on the socio-economic and physicochemical aspects of, as well as the biological community and human health issues related to, their portion of the St. Lawrence. Two series of reports for Lac Saint-Pierre and the Haut-Saint-Laurent (Lac Saint-Louis sector) ZIP committees were completed for the signing of the SLV 2000 agreement.

During this same period, all the ZIP committees held public consultations with their local populations in order to draw up lists of priority action for protection and enhancement for their area. The ten ZIP committees will have submitted 11 action plans by March 31, 1998.

TARGET RESULTS
for March 31,1998:

Prepare 11 reports covering 18 areas of prime concern (ZIPs) to support participation in developing and implementing Ecological Remedial Action Plans (ERAPs).

Provide funding and other support for 140 community projects.

Photo: Clean-Up of rivière Richelieu. Conseil régional de l'Environnement de la Montérégie

The Community Interaction Program

The Community Interaction program offered financial and technical support to community organizations, enabling them to plan and carry out projects aimed at preserving, restoring and using the St. Lawrence and its tributaries designated under SLV 2000.

Throughout the program, 100 projects from 53 non-profit organizations were financed. The total value of the projects is $6 171 922 and the program has contributed $3 154 310. More than 10 000 volunteer days and 130 person-years were devoted to achieving environmental results.

Contributions made by the Community Interaction program make it possible for community organizations to contribute to the attainment of the component objectives. The Société d'aménagement de la aie Lavallière has, for example, helped to ensure the recovery of the wood duck, a species classified as vulnerable. Severe deforestation, the drainage of marshland and hunting have reduced the species population. y setting up more than 3000 nest boxes on a 3500-hectare area of shoreline on the St. Lawrence, hundreds of groups and individuals helped the species nest and increase its population.

ENVIRONMENTAL RESULTS

Waste collection	1828 tonnes
Habitat restoration or improvement	82 hectares
Shoreline restoration (stabilization - replanting)	1630 km
Planting of trees, shrubs or other plant species	144 974 plants
Pesticide reduction	1375 kg
Agro-environmental assessments	50 sites
Agricultural clean-up	130 sites

DECISION SUPPORT

In order to make the best possible decisions, the public and decision-makers must rely on quality information. Activities carried out under the **Decision Support** component have made it possible to acquire environmental data, to properly analyze this information and to interpret it and make it accessible to everyone.

State of the Environment Report on the St. Lawrence

The first comprehensive *State of the Environment Report on the St. Lawrence* was published in 1996. The second, published in 1998, is based on a pressure-state-response analytical framework and identifies causal links among the various components of the St. Lawrence system. The report is made up of five fact sheets that deal with issues pertaining to the agricultural, urban and industrial sectors, as well as the management of water levels and disturbances of St. Lawrence species. It also includes an update of environmental indicators from the first report.

Scientific Information Sharing

A number of scientific and environmental information documents dealing with the various aspects of the St. Lawrence have been published or updated: 100 Info-Flash articles, a thematic report and information leaflets. A number of popularized articles have been published and the electronic and printed media have focused on the action taken and the results obtained. Environment Canada's St. Lawrence Centre documentation centre opened its doors to the public, making a considerable number of studies on the St. Lawrence available to everyone.

Input of Contaminants and Their Effect on the St. Lawrence Ecosystem

A project to measure contaminants in the St. Lawrence was undertaken for the Cornwall-Québec section. Results indicate that water flowing from Lake Ontario may contribute an important part of chemical contaminants found in the river while for other contaminants, Québec land seems to be a relatively important source. Waters of Lake Ontario contribute barely 3 percent of the total amount of suspended particulate matter (SPM) exported to Québec; the South Shore and North Shore tributaries respectively contribute 19 percent and 13 percent of the sediment in the city of Québec, and nearly 65 percent of SPM is the result of erosion of the St. Lawrence bed and shoreline.

As for corrective action planned for the Cornwall-Massena area, a follow-up program to measure the quality of SPM was implemented to evaluate the effectiveness of the initiatives undertaken in the area.

TARGET RESULTS
for March 31,1998:

Publish a second joint state of the environment report on the St. Lawrence.

Make four types of scientific and environmental documents available to the public.

Assess inputs of contaminants from the Great Lakes and 5 tributaries and their effects on the ecosystem.

Determine the proportion of airborne sources for 18 organic substances and 7 metals.

Monitor water quality in the St. Lawrence and 24 of its tributaries.

Expand knowledge of and evaluate the condition and dynamics of the beluga and other marine mammal populations of the St. Lawrence.

Photo: Sampling. Ministère de l'Environnement et de la Faune du Québec

A portrait of the contamination of game fish flesh was established for the fluvial lakes of the St. Lawrence, as well as for certain sections of the river corridor. In general, there has been a decrease in several contaminants as compared with the 1970s and the early 1980s. An fish monitoring network was established. From 1995 to 1997, in freshwater, five sections of the river were sampled in order to provide a first snapshot which will then allow us to follow temporal trends and establish spatial comparisons for a certain number of water quality indicators. Studies were also done on the ichthyological diversity along the coastal region of the St. Lawrence estuary. Finally, the Ministère de l'Environnement et de la Faune project to computerize the data collected on all fish species was fully completed.

Airborne Chemical Contaminants

In order to more precisely determine the percentage of pollutants present in the air and precipitation in the St. Lawrence basin, three families of organic compounds, as well as heavy metals, were examined. This information is useful for developing strategies aimed at eliminating or at least reducing the effects of such pollution in the St. Lawrence Valley.

Measurements of airborne toxic substances were taken at three air quality sampling sites located in Saint-Anicet, Villeroy and Mingan. The data were collected over a period of one to three years, depending on the site and the families of chemical pollutants examined. The source of the targeted compounds can now be determined and an atmospheric pollution map of the St. Lawrence can be drawn up.

Water Quality Monitoring

Water quality monitoring of the St. Lawrence and its tributaries has made it possible to collect precious data for more than 40 waterways. The goal is essentially to determine the impact of human activity (municipalities, agriculture, industry) on water quality and to assess the environmental benefits of clean-up initiatives. The studies that emerged from this program have made it possible to determine the problem areas and to pinpoint the

sources of pollution that must be monitored more closely. Studies have been produced for the St. Lawrence and several of its tributaries. Furthermore, a study on the water quality of Québec rivers, using bacterial and physicochemical quality indices, made it possible to synthesize and popularize the data collected throughout the program.

The Chaudière, Saint-François, Saint-Maurice and Yamaska rivers underwent ecosystem testing, in which their biological integrity was determined using measurements of benthic and fish communities. These rivers have also been examined for the presence of toxic substances.

Historical data taken from more than 30 000 records from various sources were standardized and computerized. These data made it possible to gather background information on experimental catches of fish since 1922 and serve as an important reference.

Analysis and Measurement Instruments

In addition to conducting tens of thousands of analyses, such as characterizations of industrial discharges and of aquatic environments, government laboratories were responsible for the quality control of analyses done by private laboratories and the certification of such facilities.

It was necessary to do more than 210 000 analyses of the river region, the monitoring, characterization and restoration networks and the research, development and certification studies. New methods of analysis, such as bioassays, were also developed.

Four bioassays were developed to evaluate sediment toxicity. These bioassays and others that had already been developed are now used as part of a methodological approach aimed at identifying the most problematic areas.

Maríne Mammals

elugas, fin whales and common seals were the subject of studies designed to assess the status of the populations. These studies focused particularly on the collection of beluga carcasses so that necropsies and pathology and chemical analyses could be performed. Aerial counts were also done on these populations and results for belugas suggest a slow increase in population. The impact of recreational tourism on the fin whale and the physical and biological factors that explain the presence of food that draws these animals to the head of the Laurentian Channel were also examined.

The Impact of Contaminants on the Marine Environment

A number of data on the contaminants present in sediment, benthic organisms and bottom-dwelling fish were collected. They help explain the transfer of contaminants from sediments to marine organisms and their impact on marine fauna. A microbacterial test was also developed. It may help evaluate the toxicity of the dredge material and the impact of digging operations at sea and monitor the state of restoration of polluted sites.

The State of the Marine Environment

A program to monitor and assess the state of the marine environment in the estuary and the Gulf of St. Lawrence was introduced. Furthermore, thanks to a network for monitoring ichthyological diversity, more is known about the state of the fish populations that frequent the estuary's coastal region. Studies show that the early life stages of marine organisms are sensitive to ultraviolet radiation.

Modelling

Researchers have worked on developing various three-dimensional coupled ocean-ice-atmosphere models of the estuary and Gulf of St. Lawrence. They make it possible to better understand and predict the processes at work on various spatiotemporal scales in the St. Lawrence system. The development of these hydrodynamic models has made it possible to offer several new products and services to different users of the St. Lawrence. The new *Atlas des courants de marée*, which covers the area from cap on-Désir to Trois-Rivières, is just one example. These models can also be used for a variety of other applications such as predicting water levels in the St. Lawrence shipping channel, producing electronic maps, searching for shipwrecks, dredging navigable waterways, producing forecasts related to the movement of ice and contaminants and producing annual tide tables.

A computer model that simulates biological productivity in the St. Lawrence estuary was developed to pinpoint and better explain the physical processes that regulate the system's production.

Remote sensing

In order to finish wetland mapping, methods for withdrawal, display and treatment of remote sensing data from LANDSAT images were used: 75 colour maps were also produced.

HEALTH

The objective of the **Health** component is to safeguard the health of riverside residents and users of St. Lawrence resources and to protect them from the effects of exposure to chemical and microbiological contaminants in the river's ecosystem. Exposure to St. Lawrence contamination is mostly the result of direct contact with the water, either by ingesting fish, other aquatic organisms or drinking water, or by swimming. In order to answer several fundamental questions about the health risks associated with such activities, some 40 major projects have been carried out by teams of researchers in the field of public health, universities and research centres working closely with the government departments concerned.

Assessing Risks Associated with Contaminants

In order to measure health risks, data on exposure to chemical and microbiological contaminants obtained from studies conducted by different riverside populations (general public, sports fishers, newborns in more exposed regions, immigrants, Native populations) were either assessed with respect to standards established by health-care organizations, or in comparison with certain suspected effects on either the immune or the endocrine system.

A total of 38 studies involving approximately 3000 participants were done under the **Health** component. These studies confirmed that riverside populations were exposed to various chemical and microbiological contaminants present in the St. Lawrence. With regard to persistent contaminants, a small percentage of individuals among the groups studied were exposed to levels that exceeded current standards. As for exposure to pathogenic micro-organisms, the studies indicated that the quality of the drinking water from the St. Lawrence is generally good from a microbiological standpoint and, consequently, there are few risks associated with it. As for risks related to swimming in the St. Lawrence, a small incidence of related pathologies was reported. An ecological study on the incidence of cancer revealed that the differences observed in terms of proximity to the St. Lawrence (riverside and non-riverside residents) were quite small.

Two types of indicators of human exposure to chemical contaminants from the St. Lawrence were developed: the consumption of game fish (indirect measurement) and the evaluation of levels of certain contaminants in the blood taken from the umbilical cord at birth (direct measurement).

TARGET RESULTS
for March 31,1998:

Evaluate the risks associated with contaminants by developing exposure indicators and other tools.

Prepare a report on public awareness of the risks associated with contamination.

Develop and communicate three strategies for reducing risks.

Monitor contaminant levels in human tissues.

Publish a report on public health in 20 ZIPs.

Photo: Christiane Hudon

Public Knowledge of Risks Associated with Contamination

Public knowledge of the risks associated with contamination was assessed in order to better understand the relationships that people have with the St. Lawrence and to determine their information needs. To do so, studies documented ways in which riverside residents use the St. Lawrence, and their perceptions of such use and related health risks.

Six studies made it possible to achieve this objective. More than 20 000 people participated in any one of these studies, the most important of which was a survey on the uses and perceptions of the St. Lawrence and what it represents to users.

A small proportion of riverside residents use the St. Lawrence and its resources. Very few take part in recreational activities that involve direct contact, such as swimming, sports fishing and fish consumption. Walks along the shores of the St. Lawrence and pleasure boating are, however, among the more popular activities. This can be explained by the fact that health risks perceived by the public are determining factors in their decision to participate in recreational activities. Several studies conducted under the **Health** component made it possible to observe the close relationship between risks and behaviour, whether consumption of drinking water or fish or participation in recreational activities. Furthermore, these studies confirm the importance of taking public knowledge and perceptions into account when formulating health warnings, and the need to consider the various groups being targeted.

Three Risk-Reduction Strategies

Achieving this result is closely related to achieving the two previous results as a means of developing and introducing communications tools aimed at reducing risk with respect to swimming, to fish consumption and to drinking water. With the help of the results obtained in March 1998, specific recommendations were formulat-

ed and risk-reduction strategies were suggested as part of the information contained in the **Health** component. Sharing these results with the public is a key element of the **Health** component, as the 22 written documents and three audiovisual aids show.

A special funding program developed to encourage the participation of citizens and community organizations helped spread the word about risk-reduction strategies by relying on groups to act as local messengers and relay relevant information. Fifteen community groups carried out their project during the two-year funding program.

Monitoring Contamination in Human Tissues

Monitoring the contamination levels in human tissues makes it possible to complete the objective of developing indicators of exposure to environmental contaminants. This is done by means of various analyses conducted on some of the populations studied under the **Health** component. An initial portrait of the spatial distribution of contamination could therefore be established.

It is estimated that more than 60 000 determinations were discovered in a variety of human biological environments, primarily the blood and hair. Aside from efforts to determine the current levels of exposure, certain studies were accompanied by methodological developments, particularly in the area of integrated biomarkers of exposure to complex mixtures and effect biomarkers.

Furthermore, human exposure was assessed through an examination of the percentage of contaminants of various sources of exposure (fish flesh, ambient air, drinking water, algae, mollusks).

Report on Public Health in the 20 ZIPs

A synopsis of current knowledge on the relationship between environmental exposure and its effects on health is an important means of informing riverside residents. A popularized report of the knowledge acquired throughout this five-year initiative is available.

Those involved in developing the **Health** component produced 11 technical reports on the health of the areas concerned, as part of the **Community Involvement** component of the ZIP program, and the writing team produced 10 regional reports.

Knowledge Acquisition

A partnership between the Fonds de recherche en santé du Québec, the National Health Research and Development Program (NHRDP) and the **Health** component resulted in the introduction of a new knowledge acquisition fund in 1995. This three-year research support fund led to the development of nine innovative and multidisciplinary studies to better understand the relationship between the health of riverside residents and the St. Lawrence.

An international scientific conference dealing with the effects of the environment on human health in the Great Lakes basin and the St. Lawrence River was organized jointly by the partners of the **Health** component and the Agency for Toxic Substances and Disease Register in the United States. The 280 conference participants were shown more than 130 presentations and posters.

PROTECTION

Príoríty Industrial Plants

etween 1993 and 1998, 106 industrial establishments were considered a priority under the action plans developed by government departments, that is, 56 new establishments in addition to the 50 already targeted under the 1988 SLAP agreement. The integrated approach (water, air, soil) served as a guide for all action taken among industrial firms. While focusing on the major objectives of reducing the discharge of liquid toxic effluent, those responsible for the **Protection** component also coordinated their efforts in the areas of air, soil and waste.

Throughout this period, an inventory of and a database on the 106 establishments were updated. Information sheets on the establishments were also produced. As for the 56 new industrial plants targeted under SLV 2000, environmental objectives and technological discharge standards were established and the types of effluent were characterized. Efforts were completed for a dozen of these plants by identifying corrective measures or programs to be implemented. The establishments concerned were asked to provide a formal commitment to take action no later than March 31, 1998.

As for the 50 industrial plants targeted by the 1988 agreement, initiatives involved ensuring conformity with the efforts undertaken and monitoring the quality of effluent discharged into the environment.

Reduction of Liquid Toxic Effluent

For the 11 industrial plants in Group 1, the objective was to reduce by 90 percent the liquid toxic effluent in inadequately treated waste waters. For five of these 11 industrial plants, the need for significant corrective action was suggested following analysis by those responsible for the dossier. According to the results of discussions and negotiations with the industrial establishments in question, corrective action could span two years, that is, 1998 and 1999. If the recommendations were implemented, the objective of a 90 percent reduction would essentially be achieved. A report produced under the **Protection** component provides a detailed description of the environmental problems of the 11 industrial plants and presents the expected results *(Rapport synthèse sur les rejets des 33 usines des groupes 1 et 2, été 1998)*.

For the 22 industrial plants in Group 2, that had already introduced treatment technologies but were likely to discharge toxic effluent, the objective was to ensure optimal reduction of liquid toxic effluent. Following verifi-

TARGET RESULTS
for March 31,1998:

Implement measures targeting 106 priority industrial plants, including 56 new ones, in order to:

Reduce by 90% the amount of toxic effluent discharged from 11 plants with inadequate wastewater treatment (Group 1).

Optimize the reduction of discharges of toxic effluent at 22 plants where treatment technologies have already been installed (Group 2).

Assess the toxic effluents discharged by 23 regulated plants and determine the corrective measures necessary to minimize effects on the receiving environment (Group 3).

Fund and support 60 technology development projects designed mainly to virtually eliminate toxic substances.

Photo: Guy Lavigueur, Punch inc.

cation and evaluation, it was observed that most establishments in this group have adopted improved production practices and have implemented the best available technologies to monitor and reduce the discharge of liquid toxic effluent. Up to six of these plants could nevertheless undertake additional clean-up initiatives or minor corrective action. The problems affecting these 22 industrial plants and their environmental performance are summarized in the above-mentioned report.

For the 23 regulated industrial plants, in Group 3, the objective was to assess their toxic effluent with respect to environmental objectives and establish the corrective measures for reducing their impact on the receiving environment. This evaluation activity was intended exclusively for pulp and paper plants. Major efforts were made by the majority of the 23 plants, both in terms of processes and clean-up initiatives, specifically the introduction of secondary treatment systems, work stemming from the implementation of federal and provincial regulations for this sector. Efforts were completed in 1995, with some $350 million having been invested by firms. These initiatives made it possible to reduce liquid toxic effluent discharged into the environment by 89 percent (according to the Chimiotox Index) by the end of 1996. Evaluation under the **Protection** component also reveals that a considerable number of environmental objectives for calculated discharge were achieved. The need to follow up with other initiatives or to improve internal practices will be dealt with in the depollution attestations delivered by the Ministère de l'Environnement et de la Faune under the *Environment Quality Act*. A report produced under the **Protection** component summarizes the environmental performance of these 23 plants, as well as 15 plants belonging to group 4 *(La réduction des rejets liquides toxiques des 38 papetières associées à Saint-Laurent Vision 2000, provisional title, March 1998)*.

For the 50 priority industrial plants targeted by the 1988 SLAP agreement in Group 4, the objective was to pursue clean-up initiatives and do an environmental assessment. From 1988 to 1995, an overall reduction of 96 percent (according to the Chimiotox Index) of liquid toxic effluent was achieved by the 50 industrial plants initially targeted by SLAP (the reduction objective was 90 percent). Comparatively, suspended particulate

matter and biochemical oxygen demand dropped by 92 percent and 96 percent, respectively, over the same period. An overall investment on the order of $650 million was made by these plants. A detailed report on the subject describes the problem and the results that were obtained *(La réduction de rejets liquides toxiques des 50 établissements industriels prioritaires du Plan d'action Saint-Laurent, Rapport-synthèse, 1988-1995)*. In addition to allowing certain plants to complete their efforts, one of the SLV 2000 activities consisted in doing an environmental assessment of the 50 plants. A dozen of these plants were involved in a special effluent characterisation program (physicochemical analyses and bioassays) in the fall of 1997.

Virtual Elimination of Toxic Substances

One long-range objective of the **Protection** component is the virtual elimination of 11 persistent bioaccumulative substances. An approach centering on adherence to environmental discharge objectives for targeted substances has been adopted. It seeks to protect human health and biological resources by maintaining or recovering all uses of the river. A brochure produced under the **Protection** component describes this approach.

In 1993, five of the 11 targeted substances were discovered in the effluent of 44 of the 106 industrial plants. Since that time, ten plants have succeeded in virtually eliminating these substances by introducing clean-up initiatives or modifying their procedures. In 1997, mercury was found in the effluent of 16 plants in the metallurgy, mining and inorganic chemistry sectors; benzo(a)pyrene was discovered in five aluminum smelters and one establishment in the inorganic chemistry sector and dioxins and furans were found in 14 plants in the pulp and paper and inorganic chemistry sectors. PC s were not found in any of the plants. With the exception of only one plant (two substances: mercury and benzo(a)pyrene), all the plants in question discharged only one of the targeted substances. From 1993 to 1997, the discharge of mercury, PC s and dioxins and furans were reduced by approximately 291 g/d, 2 g/d and 6 mg/d, respectively, corresponding to reductions of 89 percent, 100 percent and 92 percent. In general, considerable progress aimed at the virtual elimination of these substances was observed, particularly as a result of adherence to a considerable number of established environmental objectives. A report produced under the **Protection** component describes the main results *(Bilan synthèse sur l'élimination virtuelle des 11 substances toxiques prioritaires, mars 1998)*.

Technological Development

The **Protection** component also had as its mandate to support initiatives undertaken by the private sector, to develop and demonstrate environmental technologies at the pilot or premarketing stage and to promote these technologies among various partners in the private and public sectors. *The Technology Development and Demonstration Program (TDDP) and the DETALC* program have encouraged and supported the development of a number of projects with various key players from the environment industry. The areas covered were primarily industrial waste water, air emissions, soil decontamination, hazardous waste, dredging, sediment treatment, shoreline erosion and the development of environment monitoring devices.

Program managers adopted a proactive approach geared toward pollution prevention by targeting the sources of the problem directly. The technologies developed helped some 40 of the 106 industrial plants designated as priority under SLV 2000 to achieve the environmental objectives that had been established, particularly as regards the discharge of toxic substances into the St. Lawrence and its tributaries. The technologies also offered most of the 106 plants better environmental management options aimed at sustainable development. The two programs also provided support for other objectives outlined under SLV 2000, such as dredging the St. Lawrence and controlling shoreline erosion, as discussed in the **Restoration** component.

The technological and financial networks established among those promoting and using the technology and among various partners, such as research centres, universities and federal and provincial government departments, led to the emergence of strategic alliances and the development and maintenance of a quality environment industry in Québec. Through their participation, research centres, laboratories and universities were able to contribute their knowledge, thereby easing the transition between the research and marketing phases. The TDDP's success led to an agreement with the Federal Office of Regional Development, thereby ensuring that the project continue into 2001.

RESTORATION

The SLV 2000 plan has made it possible to continue with restoration efforts already begun in the first phase of SLAP. The restoration projects completed over the last five years can be grouped together under one of the following headings.

Erosion

Initiatives undertaken over the last five years have made it possible to better assess the problems of erosion along the St. Lawrence, especially in the Cornwall-Québec section. Studies have demonstrated that 400 km or 25 percent of the 1500 km of shoreline in the area being examined show signs of erosion. Furthermore, they revealed that 50 percent of the 224 islands in the Montréal-Sorel area recede an average of one to three metres annually. Given the great biological importance of the riverside environments and the significant impact of erosion, techniques for stabilizing shorelines were developed as a complement to the traditional stone beds. Pilot projects undertaken in the archipels de Contrecoeur, Îles de la Paix and baie de Rivière-du-Loup made it possible to experiment with new approaches involving the use of gabions, branches, faggots, fascines and sediment structures. This series of studies finally led to the production of a technical guide on the restoration of eroding shoreline. Atlases with a 1:20 000 scale make it possible to locate all the eroding riverside portions of the Cornwall-Québec section, whether natural or manmade.

Habitats

Urbanization, industrialization and intensified farming practices have greatly disturbed the St. Lawrence and its main tributaries. In an attempt to amend the situation, existing restoration technologies were further developed or adapted with a view to bolstering the potential of habitats that had deteriorated or had low productivity. The following pilot projects were undertaken:

- the restoration of the marais de Cacouna in an effort to counter the dyking and encroachment from the port. A perched marsh with a small drainage basin and some vegetation plantations were created in the embankment areas and among the stone beds bordering the existing bodies of water;
- the restoration of the grassy marshes in an effort to offset the effects of farm drainage that results in a drying up of the depressions, and a modification of the vegetation cover in the adjacent marshes. Another project was designed to allow the salt water to once again enter the marshes that had been dyked by means of aboiteaux, using a pumping system powered

TARGET RESULTS
for March 31,1998:

Clean up the Canal de Lachine.

Implement 6 habitat restoration pilot projects.

Produce four enhancement and restoration plans

Photo: Canal de Lachine. Parks Canada

by a wind generator. A guide for grassy marsh restoration, which pinpoints the marshes where restoration is recommended, is available;

- the enhancement of certain riverside peat bogs that had already been exploited. These naturally acidic peat bogs were not very attractive breeding grounds for waterfowl species. The project undertaken at Isle-Verte consisted in creating four 360-m2 ponds from a single drainage canal in the bog. In order to reduce the acidity in the newly created ponds, an experimental alcaline filter containing limestone was used and proved successful. Subsequent follow-ups revealed the need to introduce aquatic vegetation in the bodies of water in order to encourage the colonization of a variety of invertebrates that could serve as food for black ducks nesting in the peat bog;
- the creation of a marsh in an agricultural area. The goal of the project was to create artificial marshes that are able to treat waste water from a dairy farm while at the same time serving as wildlife habitats. A portion of the purifying marsh, reserved specifically for fauna, contains more diversified vegetation composed of cattails, bullrushes, lily pads, arrowhead and pondweed;
- the restoration of a disused sand quarry in Saint-Jean-Chrysostome. The pilot project consisted in creating two bodies of water, each measuring one hectare, and enhancing them with aquatic vegetation that could eventually serve as food for wildlife. Tiny islands that could be used as resting and nesting grounds for waterfowl were also created.

A guide for the restoration and development of freshwater habitats in the section of the St. Lawrence between Cornwall and Trois-Rivières was also created. It describes techniques for enhancing the value of emerging and submerged marshes in the area and of certain insular areas for waterfowl by creating ponds and by more effectively managing agricultural areas through the control of predators.

National Wildlife Area

Three federal sites were selected for development under the SLV 2000 action plan. They are: the islands under federal jurisdiction between Montréal and Sorel, the national wildlife area in Cap Tourmente and the Îles de l'estuaire National Wildlife Area. The plans for development describe the resources needed for each area, their respective problems and the development and restoration projects planned for the next five years.

The Canal de Lachine

Century-old industrial activities in the area surrounding the Canal de Lachine have resulted in contaminated water, sediments and certain portions of land. The opening up of the St. Lawrence Seaway in 1959 led to the closing of the canal to commercial navigation. The use of the canal for recreational purposes has been prohibited since 1982 because of the poor water quality and the presence of contaminated sediment. The studies conducted revealed that these sediments contain concentrations of copper, chromium, lead, zinc, mercury and, to a much lesser degree, PC s, which exceed harmful levels. After the sewers were connected to the Saint-Pierre main drain and intercepting sewer, the canal's water quality improved to such an extent that recreational activities not involving direct contact with the water can now be practised.

A project aimed at the decontamination of the sediment in the Canal de Lachine was begun in 1988 under SLAP and efforts were renewed in 1993. Parks Canada undertook the clean-up of the sediment at the bottom of the canal. Among the six options under consideration, Parks Canada had chosen the one that consisted in isolating the contaminated sediment in capsules built along the shores of the canal in the canal, using synthetic membranes.

In 1990, the (federal-provincial) Joint Environmental Assessment Panel agreed to hold a public hearing on the environmental impact of the various sediment decontamination options.

Following public hearings, the panel submitted its report and recommended against the large-scale decontamination of sediment in the Canal de Lachine, since it was not a threat to public health and the expected environmental gain was small. The applicants accepted the recommendations.

The reopening of the Canal de Lachine for pleasure boating has played a key role in the economic upsurge in the southwest part of Montréal and is part of the federal action plan for the Greater Montréal area. Models have shown that the reopening of the canal does not pose any risks of raising the contaminated sediment.

The Archipel de Mingan

A multipurpose marina was set up in Havre-Saint-Pierre, in the Mingan region. reakwaters have been built and landscaping and inside renovation projects have been completed. This marina has made it possible to improve the effectiveness of programs that are environmental priorities, the monitoring of natural resources, the application of laws and public safety measures. It has also reduced the risks of accidental oil spills by providing the area with a safe and stable environment for the handling of these types of substances.

COMMUNICATIONS

Throughout the implementation of SLV 2000, a number of communications activities played an important role in keeping the general public and key partners apprised of the progress being made. Federal and provincial government partners involved in SLV 2000 ensured that newly acquired knowledge about the state of the St. Lawrence and its tributaries was made available by publishing research results and the findings of environmental and health assessments. They also made sure to convey this knowledge and information to those who are most directly affected, including riverside residents.

There has certainly been increased participation in the implementation of SLV 2000 by the public and non-government organizations in the past five years. From a communications standpoint, this increased participation has resulted in activities that have enabled interested parties to express their concerns about the St. Lawrence and its tributaries and to participate in discussions on the issues to be tackled in the next decade, particularly those of the third phase of the action plan.

The key communications activities that were carried out are listed below.

CORPORATE ACTIVITIES:

Production and distribution of the *1988-1993 Report* under the St. Lawrence Action Plan

Production and distribution of the *1993-1995 Biennial Report*

Production and distribution of the *1995-1996 Annual Report*

Production and distribution of the *1993-1998 Five-Year Report*

Production and distribution of 13 issues of the newsletter *Le Fleuve*

Organization of a conference with the Association des biologistes du Québec, *Le Saint-Laurent pour la vie*, to recap initiatives undertaken in the past 20 years and to look to the future

Creation of an SLV 2000 web site

COMMUNICATIONS ACTIVITIES FOR EACH COMPONENT:

BIODIVERSITY

Distribution of the *St. Lawrence Beluga Recovery Plan and the Plan de mise en œuvre des partenaires de SLV 2000 en réponse aux recommandations in the Beluga Recovery Plan*

Production and distribution of two videos entitled *Mission: Marine Mammals and Bonaventure: a healthy barachois*

Distribution of recovery plans for threatened species, including the horned grebe and the yellow rail

Organization of annual workshops on habitat conservation

Distribution of an insert entitled "Place à la iodiversité" in the magazine *Franc-Vert*

Distribution of 11 reports on plants likely to be listed as threatened or vulnerable

Contribution to the realization of the exhibit at the iodome: *Pour la suite des Bélugas*

AGRICULTURE

Publication and distribution of a brochure on agro-environmental issues and possible solutions entitled *Pour une eau de qualité en milieu rural - comprendre et agir collectivement*

COMMUNITY INVOLVEMENT

Distribution of 13 regional environmental reports covering priority areas under SLV 2000

Sharing of environmental data contained in the regional reports during public consultations held by ZIP committees

Distribution of the annual report of the Community Interaction program

Announcement of financial contributions from the Community Interaction program

DECISION SUPPORT

Distribution of the *State of the Environment report on the St. Lawrence*

Production and distribution of 12 maps from the *Atlas environnemental du Saint-Laurent*, as well as 100 Info-Flash articles and two thematic reports

Production and distribution of technical reports and popularized brochures on the water quality of the St. Lawrence and other rivers

Production and distribution of the tides atlas entitled *Atlas des courants de marée*

Production and distribution of a fact sheet entitled *The Aerial Census of St. Lawrence Belugas*

Distribution of the 1995 edition of the *Guide de consommation du poisson de pêche sportive en eau douce*

roadcast of a story during Découverte about research on rorquals in the St. Lawrence estuary

HEALTH

Distribution of an insert entitled "À notre santé, Saint-Laurent!" in the magazine Franc-Vert

Production and distribution of the videos entitled *À notre santé, Saint-Laurent!* and *L'alimentation des Nords-côtiers et la santé*

Production and distribution of 11 technical health assessments covering the areas being studied under the ZIP program

Production and distribution of the results of a survey on the knowledge, perceptions and uses of the St. Lawrence in a brochure entitled *Reflet du Saint-Laurent, la parole aux riverains*

Organization of an international scientific conference on the impact of the environment on human health in the Great Lakes and St. Lawrence River basins entitled *Conférence Santé 1997-Grands Lacs et Saint-Laurent (excerpts in a special issue of Environmental Research*, 1998)

Production and distribution of a current synopsis of information on the St. Lawrence and health

PROTECTION

Production and distribution of two series of fact sheets on the 106 industrial establishments targeted by SLV 2000

Production and distribution of a report entitled *La réduction des rejets liquides toxiques des 50 établissements industriels prioritaires du Plan d'action Saint-Laurent, Rapport-synthèse 1988-1995*

Production and distribution of a report entitled *Les rejets des 33 usines des groupes 1 et 2 du volet Protection*

Production and distribution of a report entitled *La réduction des rejets liquides toxiques des 38 papetières associées à SLV 2000*

Production and distribution of a report entitled *Bilan-synthèse sur l'élimination virtuelle des 11 substances toxiques prioritaires*

Distribution of 35 fact sheets in the "St. Lawrence Technologies" series and two project profiles available on Internet

RESTORATION

Production and distribution of a technical guide for the restoration of eroding shorelines

GOVERNMENT EXPENDITURES FOR 1993-1998

(IN THOUSANDS OF DOLLARS)

COMPONENT	FEDERAL GOVERNMENT					QUÉBEC GOVERNMENT		TOTAL
	Environnment Canada	Fisheries and Oceans Canada	Health Canada	Agriculture and Agri-Food Canada	Canadian Heritage	Ministère de l'Environnement et de la Faune	Ministère de la Santé et des Services sociaux	
iodiversity	11 129.8	6 329				6 118.1		23 576.9
Agriculture				2 135		514.6		2 649.6
Community Involvement	5 238.2	750	158.5			360.8		6 507.5
Decision Support	15 871.4	4 661				19 003.7		39 536.1
Health			7 600				3 758.9	11 358.9
Protection	18 711.1					56 799.1		75 510.2
Restoration	4 846.1				4 960.1			9 806.2
Communication and Administration	1 821.1					895.4		2 716.5
TOTAL	57 617.7	11 740	7 758.5	2 135	4 960.1	83 691.7	3 758.9	171 661.9

The difference between budget forecasts for the federal government and actual expenditures is mainly related to budget reductions due to government program reviews.

ECONOMIC SPINOFFS

The St. Lawrence has always played a vital role in Québec's economic and social development. In addition to supporting one of the richest communities of flora and fauna, the St. Lawrence fosters the development of industrial, commercial, recreational and sociocultural activities.

The Economic Impact of SLV 2000

Approximately $243.1 million were pumped into the Québec economy over the past five years under the SLV 2000 action plan, and including more than 160 000 volunteer hours put in by members of the community. Of the $243.1 million, 26 percent came from sources other than government funding initially intended for SLV 2000. From 1993 to 1998, this amount helped generate more than 3350 direct and indirect jobs, resulting in an added value of $178 million and additional revenues for the federal and provincial governments of the order of $22 million and $34 million, respectively. Government budgets were reduced following two federal program reviews.

Furthermore, SLV 2000 activities made it possible to expand promising industries and generate large-scale profits that benefit the entire Québec population. The environment industry, for example, whose sales figures exceed $300 billion per year (including $16.7 billion and 123 000 jobs in Canada), should have a rate of expansion of 10 percent per year by the year 2000.

Technological Development

In **Protection** component, The Technology Development and Demonstration Program (TDDP) and the DETALC were not only environmental but also economic repercussions. Sixty-eight projects were carried out under these two programs: Environment Canada invested a total of $2.9 million, while partners from the public and private sectors made additional investments of more than $13.3 million. A little more than 68.8 percent of projects resulted in the development of new technology, while 25.2 percent led to the adaptation of existing technologies, depending on the needs and restrictions of Québec companies. The projects funded by the two programs generated a total of 230 person-years of work over a period of five years.

An Example of Partnership and Cooperation

The multiplier effect of SLV 2000 in terms of investment and cooperation allowed for the expansion of certain green industries and action to be taken by regional and provincial players. It also helped bring various partners closer together. Through economic analysis, it was possible to conclude that every dollar invested in the action plan was accompanied by the following additional investments from other sources:

- $0.35 for the entire program, taking into account federal and provincial contributions to SLV 2000;
- $3.40 from the environment industry, in addition to generating $3.10 of profits for companies;
- $1.00 for the entire **Community Involvement** component, which implies a ratio of $1 to $2.85 for the projects carried out by the ZIP committees.

Profits for the Majority and for Future Generations

The cost-benefit ratio for the program is estimated at 6.5, with benefits estimated at approximately $2 billion over five years. A sensitivity analysis reveals that the ratio varies between 2.5 and 7.4. On the basis of these results, it can be concluded that:

- from a purely economic standpoint, SLV 2000 is a sound investment because the benefits generated by action plan activities easily outweigh the costs incurred by government and other partners;
- pursuing the action plan, particularly the more promising economic activities, will result in profits that will easily outweigh past and future investments.

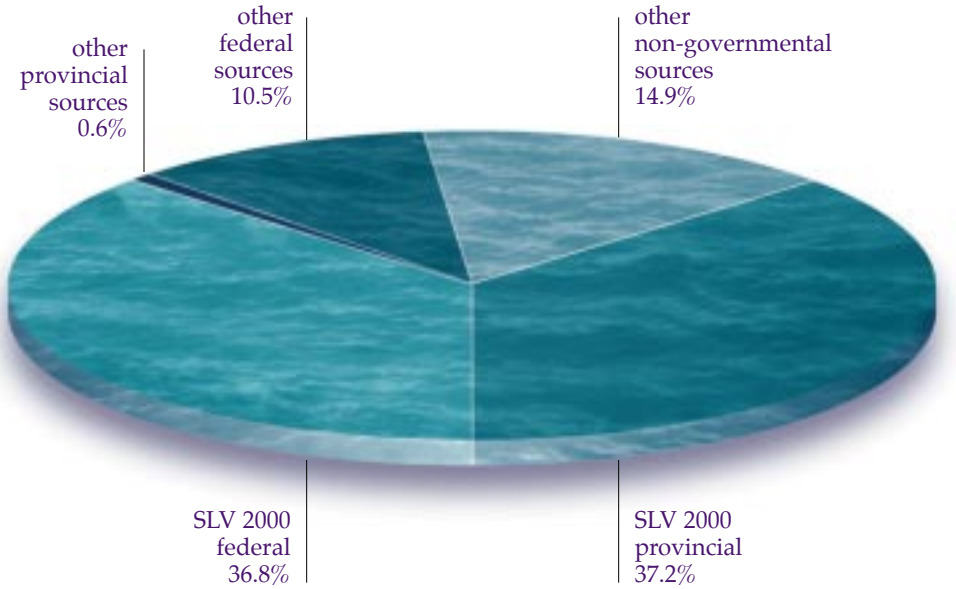
An Example of Social Equity

When money is invested in the economy, the activities or products that are generated always benefit certain groups in society. The distribution of these profits and the number of beneficiaries are a good indication of the performance of public investments. When they invest public funds, governments must ensure an equitable social distribution and the greatest possible benefits. The SLV 2000 action plan is a good example of social equity because the actions fully benefit more than three million Québecers as well as future generations. They are

able to fully benefit from a better quality of life, job creation in promising fields, new regional development possibilities and better environmental conditions for improved health.

DISTRIBUTION OF EXPENDITURES FOR SLV 2000 ACTIVITIES

Total estimated expenditures: $243.1 million



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