LE FLEUVE

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IN TUNE

COUNTDOWN

Some nine months before the expiry of St. Lawrence Vision 2000, assessment reports on the seven components are already in the works. Several projects have been completed, and for those which have not yet wound up their activities, managers have determined the stages yet to be completed that will allow them to sign their final reports on March 31, 1998.

In this issue, we are starting to get reports on the recapitulations that are essential for those who wish to plan well for the future. The article on the achievements of recent years, in particular, as regards the cooperation between partners and the work methods which have changed substantially, allows us to judge the progress made since the St. Lawrence Action Plan first started up in 1988. And speaking of the future, we will give you the low-down on an eventual follow-up to SLV 2000, on the drawing board since early 1997.

In the other articles, we have a major report for you on the Community Involvement Component—one of the major success stories of SLV 2000—and we met with the researchers who ascertained the bioindicators for the monitoring of the health of the St. Lawrence's ecosystems. In both cases, knowledge which has been gathered for several years on the river and on the wishes of the riverside communities have enabled researchers to set realistic and feasible objectives for the coming years.

The achievements of nine years of intergovernmental cooperation

Some nine months before the expiry of St. Lawrence Vision 2000, most departments and agencies have already begun drafting assessment reports on the five years' duration of the agreement. Although it is still too soon to "close the books" as the accountants say, we can still take a glance at the main themes of cooperation as they now stand between the federal and provincial governments, and how the objectives and working methods of the people behind SLV 2000 have been reconciled.

Relations between agreement partners

"Even if the work was not always easy, in view of the rather complicated context of grouping several departments in two levels of government, we can say off the bat that we will have succeeded in attaining the vast majority of the objectives we had set ourselves," declares straightaway George Arsenault, the Quebec Co-chair of the SLV 2000. Of course, these results would not have been as convincing if the structures that were set up had not promoted, as much as possible, discussions and the sharing of information. "We developed a mode of operation which worked well; with the federal-provincial harmonization teams heading each of the seven intervention components of SLV 2000," notes François Guimont, the federal Co-chair of the agreement. "As far as that is concerned, we truly improved upon what was already started under the 1988-1993 St. Lawrence Action Plan."

"Above and beyond the traditional ways of operating, we also learned to place emphasis on the ecosystem," explains Michèle Bélanger, from the ministère de la Santé et des Services sociaux du Québec (MSSSQ) and Co-chair of the Health Component of SLV 2000. "One of the best examples is the Great Lakes and St. Lawrence Health Conference which was held last May 12 to 15. It was the first time that the governments of Canada, Quebec and the United States acted as joint hosts in a conference on environmental health as related to the Great Lakes and the St. Lawrence." The emphasis on the river

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Photos: Louise Leblanc

George Arsenault, Quebec Co-chair of the SLV 2000 Agreement

François Guimont, federal Co-chair of the SLV 2000 Agreement

was also noted by Marc Hudon, President of Stratégies Saint-Laurent: "The river is our only client, and I believe that people were able to feel the extent of faith that all the partners had in the undertaking."

This harmonization did not occur without a struggle. "Harmonizing, as part of an exercise such as SLV 2000, the activities emanating from projects or programs already under way with the respective partners, is a source of certain difficulties. We have had to adjust to this reality," points out Esther Côté, the federal Co-chair for the Agriculture Component. Furthermore, the organizational cultures of the various departments were at times quite different, which required a big dose of good will and transparency. "It required a real apprenticeship in interdepartmental relations," adds Esther Côté.

The advent of the SLV 2000 Advisory Committee, two years after the effective beginnings of the agreement, was not always easy, since all the projects had already begun. "We designed the composition of the committee in such a way as to make sure that the networks represented on it were useful to the managers of SLV 2000," points out Harvey Mead, Chair of the committee. Our presence and our demands most certainly constituted additional pressure when we asked for certain reports, but this was done in the spirit of drafting pertinent opinion papers at the right time for all participants of SLV 2000."

It was akin to a normal adaptation period. Pierre Boisvert, general manager of the Laurentian Region at the federal Department of Fisheries and Oceans, adds: "These difficulties nonetheless generated one of the best accomplishments of the agreement. The habit of consulting our partners, be they signatories or not of the agreement, is much more widespread. Before, projects could have been completed "vertically" within departments; now we can no longer operate in isolation."

"SLV 2000 allowed for a variety of stakeholders to work together harmoniously and efficiently in the accomplishment of their mandates. Every level of government or department unit involved benefits from the positive fall out of the program," adds Pierre Boisvert.

Environmental accomplishments

According to François Guimont, we are heading toward a very positive assessment as regards the environmental findings of SLV 2000. "In my opinion, the 'science' and 'action' aspects are integrated smoothly, since we can see and measure substantial achievement in the field. "This point of view is shared by his Quebec counterpart, George Arsenault: "The boosting of knowledge—which accomplished, among other things, the beluga restoration plan—was, I believe, a very positive result of the last few years. We have also made strides in industrial clean-up and the protection of certain strategic habitats."

"The specific timetables in the agreement and the priority industries selected along the St. Lawrence made for very positive achievements," declares Marc Hudon. "We honed certain methods which let everyone have his say. I believe that the ZIP program will have succeeded in informing managers quite concretely of what people considered very important to be done. As such, the cooperation and close ties which grew between the members of the regional branches of the MEFQ and the members on the ZIP committees accomplished a great deal for a lot of people. The general climate in outlying regions greatly improved, because of the strong sense of belonging and the concern for concrete accomplishments in the field which were enhanced both with the members on the ZIP committees and the representatives of the MEFQ."

"Thanks to the ZIP program, we became closer to the public," interjects Michèle Bélanger, "and we have a much better idea now of the perception people have of the St. Lawrence. We have also honed our expertise in public and environmental health." According to François Guimont, the health and environment connection is in fact one of the best things to come out of SLV 2000: "It was normal to make the link between health and the environment."

Finally, the farming pollution theme became much more high-profile over the past few years. "We don't know the extent of this type of pollution on human health and ecosystems," says Esther Côté, "but I believe that SLV 2000 has boosted environmental thinking in the farming community."

A follow-up to SLAP and SLV 2000?

Even though several objectives of St. Lawrence Vision 2000 were reached, people must not be led to believe that we now have the best of both worlds and that the St. Lawrence can continue to flow without any worries. François Guimont and George Arsenault, the two co-chairs of the agreement, are not hiding the fact that the ministers responsible in Québec City and Ottawa have asked them to pave the way for an eventual follow-up on SLV 2000 and that the preparatory work actually began several weeks ago. "We obviously consider this request as a positive indication of the governments' will to pursue the work already begun," indicates François Guimont. "However, we cannot outguess the decision of the elected officials at this stage; much remains to be done before announcing another five-year plan. But we are working intensively in planning a cornerstone project for the coming years."

Devising a Follow-up to SLV 2000

Having received in December 1996, from their respective ministers, the mandate to prepare a project that would follow in the footsteps of the five-year St. Lawrence Vision 2000 program, in early 1997, Messrs. François Guimont and George Arsenault, co-chairs of the agreement, kicked off a process conducive to reflections and discussions on what could be contained in a future Plan III on the St. Lawrence.

The first stage of the process was self-evident: how should the SLV 2000 managers proceed in order to obtain the greatest participation possible in the formulation of the key issues which would eventually be translated into the five-year (1998-2003) plan? The Management Committee of the agreement therefore gave the Coordination Office of SLV 2000 the duty of defining a development process, the stages of which would facilitate exchanges and discussions among the partners.

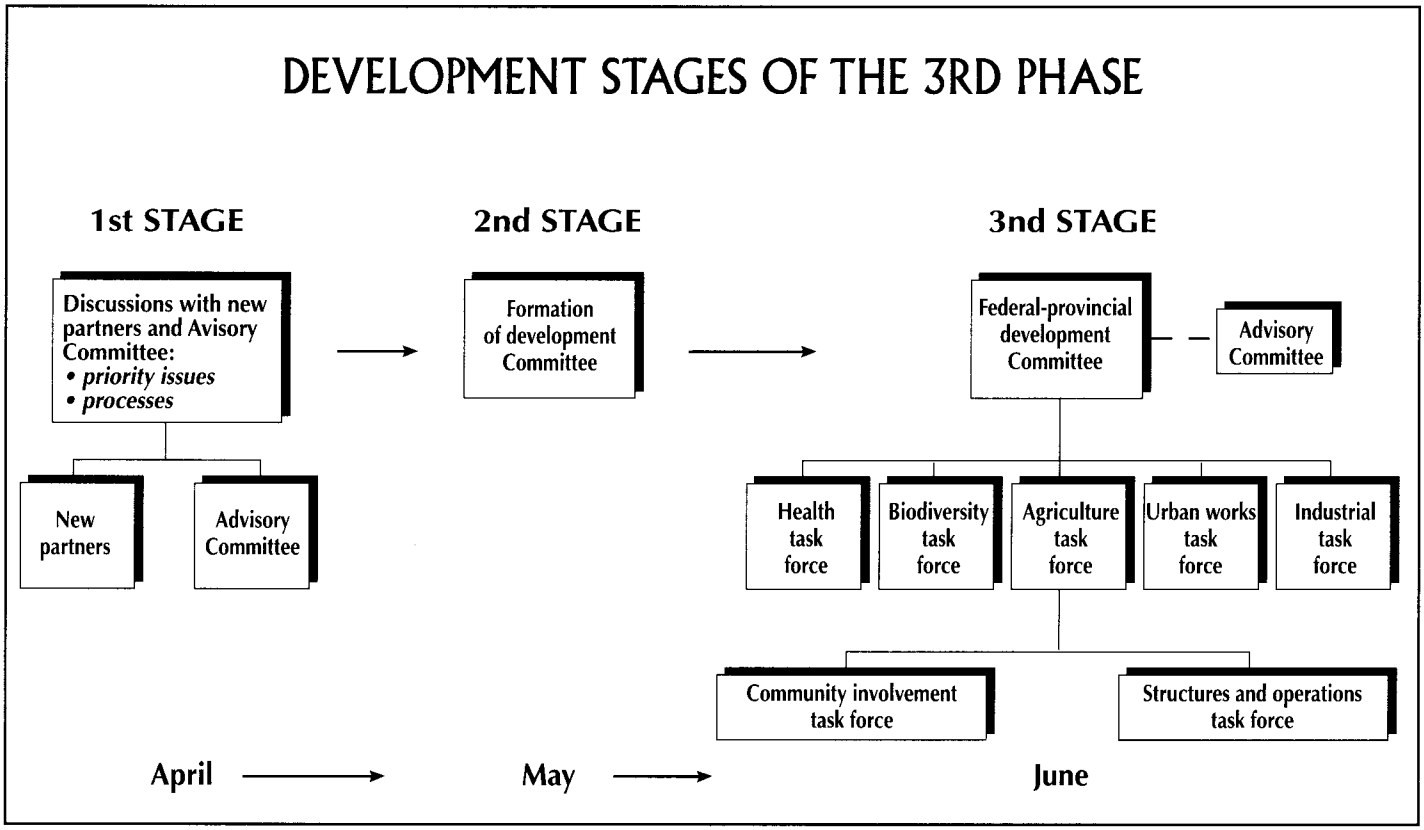
A three-stage process

"In February 1997, we proposed a process comprised of three major stages, at a meeting with representatives from the federal departments and the MEFQ", explains Jacinthe Leclerc, head of the SLV 2000 Coordination Office. "These players then began, within their own departments, to reflect on what they thought would be the most important issues to be included in a future program. That preparatory stage gave rise to a common vision shared by the present-day partners, in terms of the issues from which a future plan should seek inspiration, and also lead to the identification of new partners who should be asked to participate in the discussions on a follow-up to SLV 2000."

The first stage consisted in determining the priority issues that a future program could 'sink its teeth into'. Based on the ideas of present-day partners, new partners, and the Advisory Committee, a preliminary list of priority environmental concerns was prepared in the spring. They include: farming, urban and industrial concerns—the three major sources of pollution of the St. Lawrence's ecosystems—and the challenges for health and biodiversity. "These major avenues for development must not be perceived as already being set in stone," George Arsenault points out. "However, we had to go through the exercise with a view to optimizing the preparatory phase of the future plan."

The second stage was to set up a federal-provincial development committee that is to coordinate the action of five task forces grouping managers and experts alike in accordance with the five priority areas of concerns as determined in the first stage.

The formation of the task forces and their preparatory work make up the third stage. "The experience of SLV 2000 allowed us to view community involvement, the contribution of scientific knowledge and communication issues as being a necessary part of each component," says Jacinthe Leclerc.



"That is why we will find in each task force participants with this capacity so they can make their viewpoints known." The composition of the groups will also reflect the participation of all partners, current and potential, of the future Plan III. "Since it is still early in the year and the partners have not yet sent us their answers," indicated Ms. Leclerc, it is difficult to be more specific for the time being."

The outcome

"To date, the many discussions we have had allow us to say with certainty what the three major objectives will be in a future Plan III," confides François Guimont. "The safeguarding of public health, that of the St. Lawrence ecosystem and access to the river are all issues which are of great interest to all parties involved. For the past few years, the public consultations held within the scope of the ZIP Program have also allowed us to gain a better grasp of what shoreline residents expected from their governments."

"The St. Lawrence Action Plan (SLAP) was particularly useful in collecting and updating data on the St. Lawrence River," states George Arsenault, "and St. Lawrence Vision 2000 has allowed us to bridge the gap between the expertise acquired and on-site interventions. I believe that the 'activity' aspect should be the primary feature of a future program, as well as the dissemination of what has already been learned."

The development process calls for the task forces to come up with, by next October, detailed action programs that will be submitted to the Development Committee. That committee will then table proposals with the Management Committee which will send, to the elected officials, what could be the five-year 1998-2003 program concerning the St. Lawrence.

"There are still substantial problems that need to be resolved with regard to the St. Lawrence," adds François Guimont. "We trust that the process agreed to by the partners will give us the necessary support to determine, very specifically, what could be achieved in the coming years."

A *Code of Ethics* for users of the St. Lawrence

With a view to imparting a responsible attitude vis-a-vis the irreplaceable resource which constitutes the River, in 1996, the *Société de développement économique du Saint-Laurent (Sodes), or St. Lawrence Economic Development Council,* adopted a code of ethics for users of the St. Lawrence River. Initiated in 1994, the code sets forth a few major principles that members agree to promote in their businesses, organizations and communities. Although they are not legally bound by the membership, they nevertheless morally agree to comply with the code in their activities and actions.

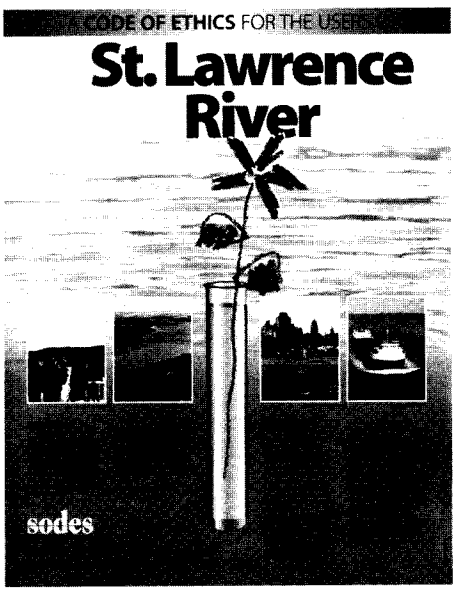
Six major principles

The code of ethics for users of the St. Lawrence comprises six major principles that aim to guide and inspire the practices and interventions of each member regarding the St. Lawrence River:

- The river is used for many purposes, and these uses are complementary;
- Users must be respectful of the each person's rights, in a spirit of cooperation;
- Users must strive to protect and improve the condition of the St. Lawrence;
- Users must set an example as regards damage prevention and repair;
- Users must lobby to improve the environmental legislation governing the St. Lawrence;
- Users must show willingness to promote the code within their communities.

A code to be posted

The code appears as a colour poster, both in English and in French. *Sodes* suggests that members display it as often as possible in order to encourage people to adopt a protective attitude toward the river. *Sodes,* founded in 1985, is akin to a "maritime chamber of commerce" for the St. Lawrence; it unites various parties interested in the St. Lawrence from economic and environmental circles.



Copies of the code (in poster format) may be obtained from *Sodes,* at 271, rue de l'Estuaire, C.P. 2268, Québec (Québec) G1K 7P7; Tel: (418) 648-4572; Fax: (418) 648-4627.

Community Interaction Program

Kicked off in June 1994, or more than a year after the official beginning of St. Lawrence Vision 2000, the Community Interaction Program has received 197 proposals to date from NGOs wishing to make a contribution toward solving the environmental problems in certain sections of the river. Of these proposals, 89 projects were retained, especially due to their concrete impact and the quality of actions proposed. Although the program granted subsidies to roughly the same number of projects in each of its two intervention components—46 projects in the Action Component, and 43 projects in the Studies Component—85% of the amounts allocated went to projects calling for concrete action in their communities.

Conseil régional de l'environnement de la Montérégie

Clean-up project, Richelieu river, Sorel, summer 1996.

"From the outset, we wanted to grant priority to field interventions which aimed for concrete results," explains Daniel Robitaille, a biologist/project head with Environment Canada. "That is why close to $2.3 million went to projects of this type in the space of three years. In comparison, monies allotted to Studies projects represented merely $0.4 million." $2.7 million was supplied by the two federal government partners, Environment Canada ($2.2 M) and Department of Fisheries and Oceans ($0.5 M) as a distribution assistance fund. The Quebec government contributed to the program's success by providing time and expertise ensuring its smooth operation. In addition to those partners, several other agencies were involved (municipalities, non-government organizations, private businesses) which paid, either in money or in kind, contributions which equalled the amounts advanced by the program.

A wide range of projects

The 46 projects presented and accepted in the Action Component fall under four broad categories. The biggest category is shoreline clean-up (18 projects), followed by habitat restoration (15), enhancement of natural environments (7), and shoreline stabilization and replanting (6). "Even though it is a little early for figures covering all four years of the program's existence," volunteers Daniel Robitaille, "right from the first year, there were reports of some 1,175 tonnes of garbage being collected and 2,179 hectares of habitats that were either restored or developed." The intervention projects were the most numerous where there were more wide-open, natural environments, such as in the estuary and the Gulf, rather than in the fluvial reach where the shoreline tends to be more urbanized.

"Two major reasons can explain this situation," comments Daniel Robitaille. "The environmental groups in regions far removed from the major centres are often more active and dynamic. They are in a better position to reach their clientele and are closer to the environmental problems as such. In the cities, the issues are more socioeconomic-related. The second reason hinges on the scope of the issues to be solved: in the greater Montreal region, for instance, industrial problems often exceed the capacity of the groups involved in the action projects. That is one aspect less frequent in remote areas."

"Since the projects backed by the Department of Fisheries and Oceans, Laurentian Region, were all conducted in a marine area, we obviously didn't see the difference," notes Marie-France Dalcourt, in charge of Marine Environment Intervention. "Whether the projects dealt with the conservation and enhancement of habitats, studies on species or specific habitats or else cleaning up the shoreline, the 25 projects that we accepted were fairly well divided, geographically speaking, in the estuary and the Gulf. However, we noted that despite the omnipresence of coastal habitats, there is still a need for information and awareness campaigns to be carried out with the shoreline residents. In that sense, the projects succeeded in reaching and raising the awareness of many citizens on their richness of their region."

Finally, let us mention that the 89 projects had to meet the more global objectives of the SLV 2000. Furthermore, the Biodiversity Component (enhancement of coastal habitats) occasionally help finish projects begun under the Community Involvement Component. The Health Component has its own financing program, and the Protection Component, due to the complexity of problematic issues and limited action possibilities of groups, was affected to a lesser degree.

Fallout of a varied nature

Although environmental results are the first pursued, the socioeconomic fallout of the Community Interaction Program is not negligeable either. In three years, 50 NGOs benefitted from the program, there were 6,650 person/days of volunteer work and the amounts invested on a local level are estimated at $3.23 million. ▶

The benefits are not only for people living in rural areas. For the managers, a program like this one is very enriching to get to know the field. "We have received a great deal of suggestions from people living in the community who made us aware of the wealth of certain habitats we did not know were so productive," explains Marie-France Dalcourt. "In fact, it is the entire dynamics with the regional sectors which were revitalized in the process."

With the organizations, the professionalism and quality of projects grow from year to year. "However, given the scope of urban environmental concerns, it seems to me that the groups that work there still need help in developing projects and managing them," points out Daniel Robitaille. "More than in a rural milieu, the environmental groups working in cities need this type of support."

THE COMMUNITY INVOLVEMENT

The Experience of ZIP Committees

Club V.T.T. de Grosse Ile

Dune restoration project, fence building at Pointe-de-l'Est (Magdalen Islands), summer 1996.

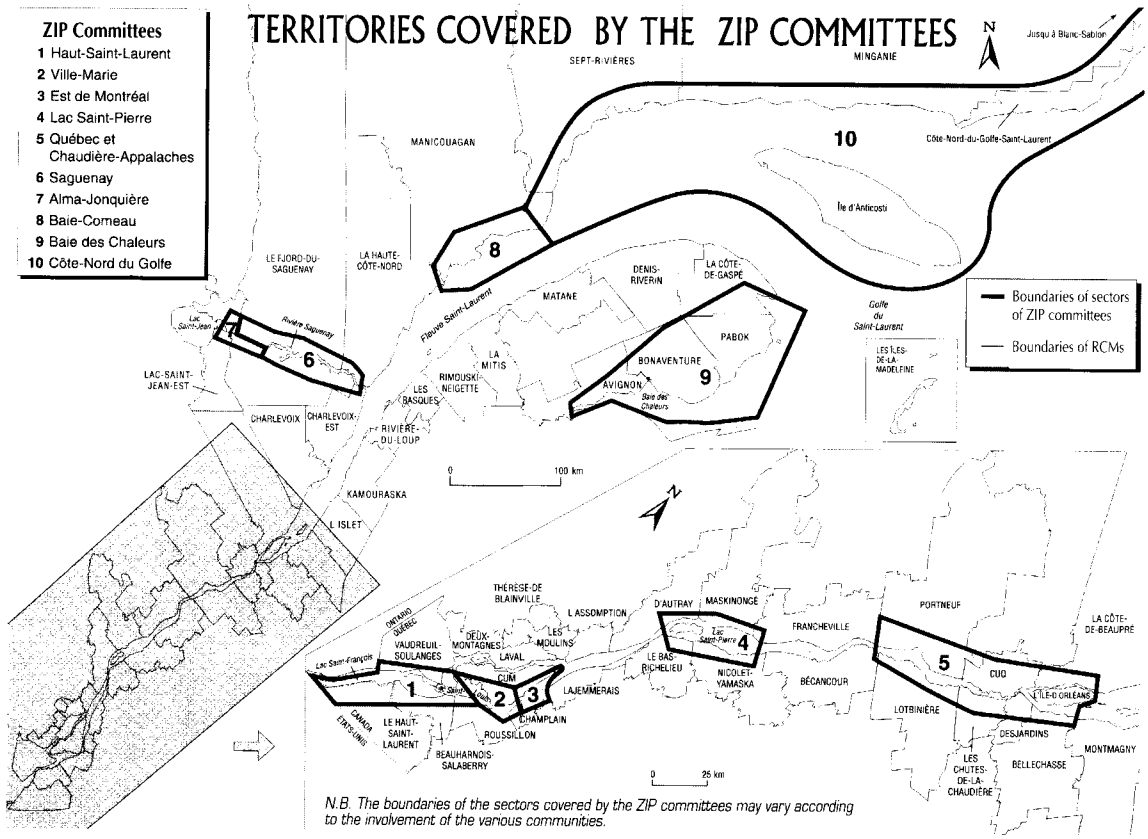
Recognizing the important role that riverside communities should play in protecting, conserving and developing the ecosystems of the St. Lawrence is considered to be one of the best successes of St. Lawrence Vision 2000. The public's participation in determining priorities became very concrete under the Priority Intervention Zone (ZIP) Program, particularly through the public consultations which began during the final months of the St. Lawrence Action Program (SLAP).

Since 1994, Stratégies St. Laurent (SSL), a non-government organization that is active in cooperative efforts with the St. Lawrence's riverside communities, provides support to the ZIP committees responsible for setting up the public consultations based on the environmental assessment prepared for each ZIP. That assessment is a summary of all the information available on the biological, physicochemical, socioeconomic and health aspects for each of the thirteen study sectors which cover most of the St. Lawrence. It is drawn up by SLV 2000's government partners. The activities conducted by Stratégies Saint-Laurent are also aimed at fostering a Quebec-wide vision by encouraging industries and municipalities to share a common objective: making the river's ecosystems healthy again.

"At the program's outset in 1991, when a ZIP committee was formed in a sector," explains March Hudon, President of Stratégies Saint-Laurent, "it was often people's curiosity, queries and frustration which led them to become informed and get involved. Today, an application to set up a ZIP committee is based on the successes of existing ZIP committees regarding the consciousness-raising achieved in the other sectors. Little by little, people are learning to get to know one another and work together with their respective viewpoints. The ZIP committees bring together individuals from all socioeconomic strata, participants gain insight into the interrelations among the various issues related to the river and develop a vision that goes a long way in prioritizing major environment concerns and actions to be taken in their sector."

A change in mentalities

The presence and contribution of federal and Quebec administrators in the process have also contributed to the development of a participatory model for communities specific to the St. Lawrence. "The ZIP program had effects both on governments and on society," mentions Jean Burton, head of Environment Status at the St. Lawrence Centre of Environment Canada. "We went from a situation where environmental organizations mostly played the role of pressure groups, to one in



N.B. The boundaries of the sectors covered by the ZIP committees may vary according to the involvement of the various communities.

which the groups became more like partners which actively participate in a cooperative effort. As for administrators, we went from a classic management mode—where actions were decided first high up on the ladder and then trickled down to the base—to a very different vision. We gradually became aware that a program that included participation from citizens and groups was a good investment since the results were more and more convincing."

"One of the strong points that should be present in the follow-up to SLV 2000," adds Jean-Yves Roy, coordinator for the Direction générale des opérations at the MEFQ and co-chair of the Community Involvement Component, "is to maintain the contribution from communities. It is remarkable when you think how much people are interested in getting to know the St. Lawrence better on the one hand, and seeing the quality of the contributions made by the public on the other. Grass-roots organizations have acquired expertise that is enviable from a technical point of view and which adds credibility to the projects."

A growing role for ZIP committees

As the process for assessment reports, public consultations and drafting of Ecological Remedial Action Plans (ERAP) in the ZIP sectors, the community consults ZIP committees more and more on environmental issues which often spill over onto issues not strictly related to the St. Lawrence. "The coordinators of the ZIP committees are now viewed as frontrunners in terms of environmental players in their region," explains Marc Hudon. "Unfortunately, we don't have the means to meet all their needs. For example, people want us to help them set up tributary river basin committees, whereas our current mission limits us to a zone of one kilometre from the St. Lawrence's shores. Expectations are very high everywhere. Similarly, we are very proud of the fact that SSL was able to develop and impart a global vision and sustainable partnership."

A new organizational culture which integrates relations with the communities came into being, for the most part, thanks to the ZIP Program. "This is part of a trend that is happening at a global level," adds Jean Burton, "which is the decentralization of the decision-making process. In a plan that will eventually follow in the footsteps of the SLV 2000, we undoubtedly won't be able to do everything, but we will certainly have to take into consideration the priorities identified by the ZIP committees."

THE STAGES OF THE ZIP PROGRAM

- The *environmental knowledge assessments* make up the first stage in the process. All drafted by the same federal-provincial team, these assessment reports constitute the basis for discussion of the second stage.
- The *public consultation*, organized in each sector by the ZIP committee, is mainly used to identify the intervention priorities in the respective reaches of the St. Lawrence River.
- The *Ecological Remedial Action Plan*, then drafted by the ZIP committee, coordinates the actions to be taken in accordance with the priorities identified in the consultation.

Stratégies Saint-Laurent assesses the public's contribution to the program as being close to 100,000 hours of volunteer work.

SCHEDULE FOR ENVIRONMENTAL ASSESSMENTS, PUBLIC CONSULTATIONS AND THE DRAFTING OF ERAPS

(in chronological order)

Numbers of ZIPs and study sectors	Environmental Assessments	ZIP Committee and public consultation	Ecological Remedial Action Plans (ERAPs)
ZIP 11 **Lake Saint-Pierre**	December 1991	Comité ZIP Lac Saint-Pierre February 1992	May 1997
ZIPs 5 and 6 **Lake Saint-Louis**	February 1994	Comité ZIP du Haut-Saint-Laurent March 1994	April 1996
ZIPs 1 and 2 **Lake Saint-François**	November 1994	Comité ZIP du Haut-Saint-Laurent February 1995	June 1997
ZIP 9 **Montréal-Longueuil**	March 1995	Comité ZIP Est de Montréal May 1995	June 1997
ZIP 14 **Québec City-Lévis**	July 1995	Comité ZIP Québec Chaudière-Appalaches November 1995	December 1997
ZIP 22 and 23 **Saguenay**	December 1995	Comité ZIP Alma-Jonquière and comité ZIP Saguenay Together in February 1996	February 1998
ZIP 18 **Maritime estuary**	September 1996	Comité ZIP Baie-Comeau October 5 & 6, 1996	March 1998
ZIPs 7-8 **La Prairie basins**	May 1997	Comité ZIP Ville-Marie June 6 & 7, 1997	March 1998
ZIPs 19-20-21	April 1997 (Regional Assess.)	Comité ZIP Baie des Chaleurs May 16 & 17, 1997	March 1998
Gulf of St-Lawrence and Baie des Chaleurs	June 1997 (Regional Assess.)	Comité ZIP Côte-Nord du Golfe November 1997	March 1998
ZIPs 3-4 **Valleyfield-Beauharnois**	November 1997	Comité ZIP du Haut-Saint-Laurent, but no consultation before March 31, 1998	— *
ZIPs 12-13 **Trois-Rivières-Bécancour**	March 1998 Chaudière-Appalaches	Le comité ZIP Québec covers ZIP 13, but no consultation before 31 March 31, 1998	—
ZIPs 15-16-17 **Middle estuary**	March 1998	No committee therefore, no consultation	—
ZIP 10 **Varennes-Contrecœur**	March 1998	No committee therefore, no consultation	—

* *The Ecological Remedial Action Plans (ERAPs) will be drafted by the existing ZIP committees, or those which will be eventually set up in those sectors.*

Monitoring the state of the St. Lawrence

From the early stages of the St. Lawrence Action Plan (SLAP), launched in 1988, emerged the need to combine efforts to clean up the St. Lawrence River with a monitoring program designed to determine the effects of environmental contamination on species within the ecosystems and to evaluate the effectiveness of pollution management measures gradually put into place, particularly those introduced by target industries and municipalities. The necessity of being able to evaluate the general state of the river also arose, in view of changes in the composition of species and in the functioning of the river's ecosystems.

"As a result of biological indication, we are now trying to find an indicator within the environment that will provide us with the answers we are seeking," explains Jean-Luc DesGranges, a researcher at the Canadian Wildlife Service of Environment Canada (CWS). "We need to find the species that provides a clear reaction and good response to what we are hoping to measure in the environment." The fine-tuning of a monitoring network, under the aegis of the CWS, was incorporated into the Biodiversity Program during the initial phases of St. Lawrence Vision 2000.

Jean-Luc DesGranges, Service canadien de la faune

Some 35 Great Blue Heron colonies are found in the Gulf and along the St. Lawrence River.

The monitoring network's dual facets: ecotoxological and ecological

From the onset, two major objectives were quite naturally established. First, researchers required that the network indicate to them the spatial-temporal variations in contamination, particularly contamination by heavy metals, PCBs and organochlorine pesticides. Second, researchers also wanted to determine whether toxic substance concentrations had reached levels that would affect the health of wildlife. The ecotoxological dimension of the network is founded on these two objectives.

The St. Lawrence River possesses a variety of vertebrate species—amphibians, birds, fish and mammals—and the costs inherent in monitoring the numbers of a population are far from negligible. The first problem to be resolved was that of carefully determining the species which would provide researchers with information, while making it possible to keep logistical and analytical problems, which can greatly add to network monitoring costs, down to an acceptable level. The network was also to contribute to the more global objectives of St. Lawrence Vision 2000. In addition, it was important that the species selected enable researchers to identify significant changes in the levels of both local sources of pollution and nonpoint source pollution. The choice of the species was guided by several criteria, including those that were ecological, morphological and physiological in nature as well as those that were associated with the population and the accumulation capacity.

In the late 1980s, the CWS did not exactly start from naught as, by that time, a large amount of literature had already been published on wildlife contamination in the Great Lakes/St. Lawrence System. Similarly, the data bank at the National Wildlife Research Centre in Hull contained numerous analytical findings concerning Québec. An assessment of the knowledge base provided a means by which to prepare the ground and give direction to research work.

Research, particularly biological and physiological, has enabled the CWS to select two species for use as bioindicators: the Great Blue Heron, which nests all along the river and in the Gulf and the estuary, and the Mudpuppy, an aquatic freshwater salamander found in the River and in many of its major tributaries. For each of these species, physiological biomarkers enable researchers to obtain information on the condition of river organisms. Jean Rodrique, Jean-Luc DesGranges and Louise Champoux of the CWS are the principal team players in charge primarily of the ecotoxicological component of the network.

The ecological component of research draws on both demographic data and productivity and dietary parameters for key species in order to detect changes in the ecosystem, especially those stemming from the impact of the fisheries on animal resources. CWS researcher Gilles Chapdelaine is particularly involved in monitoring the diet of a number of estuary and Gulf seabirds. He hopes to gain knowledge of the changes that occur within the fish communities upon which the birds feed. Work carried out in observing changes to and disturbances in the St. Lawrence marine environment food chain

enables us to obtain highly revealing indicators of the Gulf and estuary ecosystems, particularly where biodiversity is concerned. Data which is ecological in nature, for example, population dynamics and feeding, are also collected in the St. Lawrence River, with particular emphasis on the Great Blue Heron and the Mudpuppy.

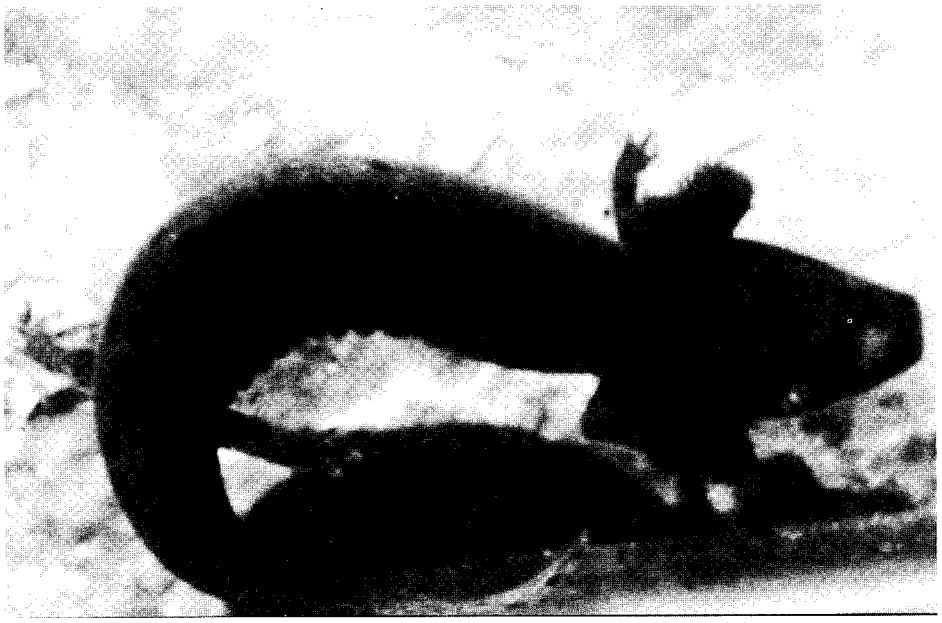
The four levels of measurement

"We are looking for four different types of answers, Jean-Luc DesGranges explains. First, we want to know the level of exposure to contaminants (heavy metals, PCBs and organochlorines). This is the measure of toxic stress borne by the individuals. Second, we want to know if these individuals suffer from the stress. Using physiological measurements, we can determine to what extent the organisms are suffering from or disturbed by the effects of contaminants. This is the measure of disease. Third, we hope to determine whether the number of animals that are diseased is significant enough to jeopardize the future of the populations. This is the measure, or impact, of the population dynamic. Last, we are trying to determine whether or not the number of species affected has an influence on the assemblage of species. In other words, is the biodiversity of the river in the process of changing?"

Depending on the species studied, there can be a considerable difference in the procedures used to collect samples and to carry out analyses. As a result of the studies on the Great Blue Heron, which are more advanced as they date back to 1977, the majority of problems that arise in the field and in the laboratory are resolved. However, where the Mudpuppy is concerned, certain elements have yet to be determined and tests are ongoing. In addition, work carried out observing the Gulf and estuary seabird population is partly dependent on available resources, which means that studies vary from one year to the next.

The Great Blue Heron

Studies of the Great Blue Heron, which nests all along the St. Lawrence, are conducted in the freshwater colonies, located at Île Dickerson (Cornwall), Île aux Herons, in the Montréal region, and at Grand Île de Berthier, in Lake Saint-Pierre. Three saltwater colonies are also studied at Île de Corneille (Montmagny), Île du Bic and Île Manowin (Sept-Îles). Each year, visits are made to one of the monitoring stations, established inland, far from the River. The visits alternate between the colony on Île Matane, in Lac Matapédia, not far from Amqui, one year, and that on Île Steamboat, near La Tuque, the next. The freshwater colonies were visited in 1996; visits to the estuary and Gulf colonies are on this year's agenda.



Joel Bonin, Canadian Wildlife Service

Mudpuppies are generally found at the mouth of river estuaries, making their home in the debris (wood, rocks) near man-made obstacles or structures, such as bridges and dams.

Not wanting to kill a single bird, the researchers have largely been conducting their work since 1994 using heron eggs, feathers and blood. "Harvesting involves two steps," explains Louise Champoux, ecotoxicologist at the CWS Ecosystem Division. "First of all, in mid-May, we go out to collect eggs from each colony. I'd like to point out that this collection does not affect the herons' production rate. Of the five eggs typically laid per female each year, an average of only 2.5 nestlings reach the fledgling stage. A few weeks later, the young of that year are measured: we climb up to a nest, catch a baby heron and bring it down. Once it is banded and a sample of blood and feathers collected, it is returned to its nest." Jean Rodrique adds, "It is important to work with the young birds of that year, as they are a much more representative indicator of the local pollution than adults what spend winter in the South."

The average concentrations of PCBs and DDEs in the eggs and blood, as well as the mercury in the feathers and blood, are measured. A battery of clinical tests is also performed to determine the levels of hormones, enzymes and vitamin A in the blood. The latter, vitamin A, has proven to be a good biomarker with which to monitor the effects of organochlorines in the ecosystem. "A good deal of effort has been put into developing tests, conducted on heron eggs and blood, that can provide us with all the answers we need," Jean-Luc DesGranges points out. "Since the findings are conclusive we no longer have to kill any birds." According to the latest findings, the average concentrations of PCBs and DDEs in Great Blue Heron eggs are generally higher than those of other species, with the young herons from river colonies and upper estuary colonies having higher contaminant levels than those from the lower estuary and the Gulf. A master inventory of the Great Blue Heron colonies will be made this year, in collaboration with the MEFQ, for the entire St. Lawrence River. In this way, we will know the precise number of active platforms (researchers' term for heron nests) in each colony.

The Mudpuppy

"We possess much less information on the physiology of the Mudpuppy," indicates Louise Champoux. "We are thus still trying to determine which physiological measurements would be best to use for monitoring the species. Our decision to choose this species was motivated by a number of factors, including the malformations detected in the Mudpuppy, the problematic of its population structure, its high level of contamination, its longevity and, lastly, its extremely sedentary nature."

Conversely, as the CWS intends to avoid killing any animals, it will be experimenting with a new method for collecting Mudpuppy eggs. The method consists in taking some females, injecting them with a hormone that causes them to lay their eggs, then returning them to their natural habitat once the eggs are laid. The initial findings, based on analyses carried out on whole specimens, on livers and on eggs, reveal high concentrations of PCBs, particularly in Lake Saint-François. The Mudpuppies are also subject to skeletal malformations. Moreover, an explanation has yet to be found for the high degree of within-site variability in contamination among individuals. Under the program, samplings are to be made every five years, with some being carried out this coming winter, then again in the winter of 2001.

Monitoring the Diet of Seabirds

Since seabird populations are highly dependent on food abundance and availability, researchers developed a monitoring program for certain species, with a view to developing a better understanding of the state of the Gulf and estuary ecosystems. Among the targeted species are the Razorbill, the Northern Gannet, the Double-crested Cormorant, the Common and the Arctic Tern, the Black-legged Kittiwake, the Herring Gull, and the Great Blue Heron.

"Having a large amount of data on the birds of the Gulf, collected over many years, means that it is easier to make comparisons," Gilles Chapdelaine says. "Even though the level of environmental contaminants is now lower, problems remain to be resolved. The drop in Cod stocks was observed to have a certain impact on the abundance of forage fish, such as the Capelin and the Sand Lance. A number of fish-eating bird colonies grew as a consequence of this abundance."

Population estimation is but one of the observation methods used. Others include the measurement of community productivity (particularly the number of eggs laid and the number of nestlings that grow to the fledgling stage) and the links between the diets of birds and their health. Samplings and analyses of eggs, carried out in tandem with the study of population dynamics, also make it possible to monitor the effect specific contaminants have on the marine avifauna of the St. Lawrence River.

RECENT PUBLICATIONS

Bilan régional secteur Gaspésie-sud–Baie-des-Chaleurs (Regional assessment - Gaspésie-sud–Baie-des-Chaleurs sector), accompanied by three technical (French-language) reports: *Synthèse des connaissances sur les aspects physiques et chimiques de l'eau et des sédiments du golfe Saint-Laurent et de la Baie-des-Chaleurs, Synthèse des connaissances sur les aspects des communautés biologiques du golfe Saint-Laurent et de la Baie-des-Chaleurs* and *Synthèse des connaissances sur les aspects socio-économiques du golfe Saint-Laurent et de la Baie-des-Chaleurs.*

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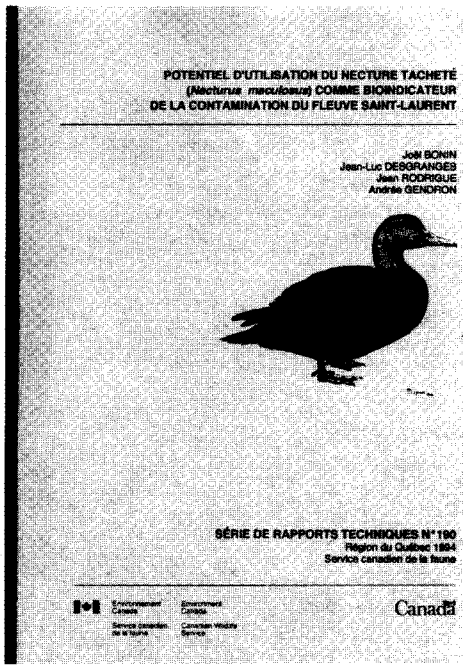
These documents are available at the St. Lawrence Centre of Environment Canada; simply call (514) 283-7000.

Synthèse des connaissances sur les risques à la santé reliés aux divers usages du Saint-Laurent dans le golfe et la Baie-des-Chaleurs (health risks related to various uses of the St. Lawrence in the gulf and Baie-des-Chaleurs-French only).

Synthèse des connaissances sur les risques à la santé reliés aux divers usages du Saint-Laurent dans le secteur d'étude Bassins de La Prairie (health risks related to various uses of the St. Lawrence in the La Prairie basins-French only).

These French-language copies may be obtained by contacting the *Centre de santé publique du Québec* at (418) 666-7000.



1995-1996 Annual Report, St. Lawrence Vision 2000, *48 pages.*

You may obtain a copy of this annual report by calling the Coordination Office of St. Lawrence Vision 2000, at (418) 648-3444.

Potentiel d'utilisation du Necture tacheté *(Necturus maculosus)* comme bioindicateur de la contamination du fleuve Saint-Laurent, *Joël Bonin, Jean-Luc DesGranges, Jean Rodrigue, Andrée Gendron, Tehnical reports series No. 190 (Catalogue No. cw 69-5/190F (French only), Quebec region, 1994, Canadian Wildlife Service.*

This report may be obtained from the Canadian Wildlife Service, Quebec region, 1141, route de l'Église, C.P. 10100, Sainte-Foy (Québec) G1V 4H5

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St. Laurence Vision 2000

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