LE FLEUVE

NEWSLETTER
ST. LAWRENCE VISION 2000

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Bacteria to the rescue of oil-soaked aquatic vegetation

Photo : Fisheries and Oceans Canada — D. Chamard

Several federal and Quebec departments have joined with the private sector in establishing environmental emergency response teams to deal with oil spills in the St. Lawrence. Furthermore, to improve the efficiency of clean-up operations in oil-contaminated beds of aquatic vegetation, Fisheries and Oceans Canada, the U. S. Environmental Protection Agency, France's Centre de documentation, de recherche et d'expérimentations sur les pollutions accidentelles des eaux (documentation, research and experimentation centre on accidental spills in aquatic environments) and Environment Canada have joined

IN TUNE

Bacteria to the rescue of oil-soaked aquatic vegetation

A promising experimental project uses micro-organisms found naturally in soil to restore beds of aquatic vegetation contaminated by oil.

The Quebec government's agro-environmental program supporting its plant health strategy is already producing results

Sixty or so projects submitted by farm producers and funded under the program have led to the creation of development, training and technology transfer tools.

ZIP Chronicle

The Rive Nord de l'Estuaire ZIP Committee is undertaking a project to protect and enhance coastal habitats within its territory. The Guide d'intervention en matière de protection et de mise en valeur des habitats littoraux d'intérêt (Guide to Protecting and Enhancing Valuable Shoreline Habitats) will be published shortly.

SUMMARY

Canada

Saint-Laurent Vision 2000

Québec

forces to create a new tool for cleaning up oil spills, based on the use of soil bacteria. The project is part of the Navigation component of St Lawrence Vision 2000, one of the objectives of which is to improve management of the environmental risks and dangers associated with navigation in keeping with the goal of sustainable development.

Every year, there are roughly 140 accidental oil spills in the St. Lawrence. Notwithstanding the best efforts of emergency response teams deployed to the scene of a spill, sometimes some of the oil reaches the shore. At this point, specialists can use a number of different techniques to recover the oil. For example, if the spill affects a sandy beach, contaminated sediments can be collected mechanically and then treated to eliminate the contaminants. If the spill occurs on a rocky coast, the oil can be scraped off and the rocks cleaned with high-pressure sprays of hot water. In some cases, however, these methods may be more damaging to the environment than the oil spill itself.

Spills may also affect beds of aquatic vegetation, which are abundant along the St. Lawrence and are highly productive habitats for a number of wildlife species, which use them for breeding, feeding and resting. The previously described techniques are not suitable for these beds and emergency response teams can only seek to recover the oil floating on the surface of the water or take the more radical step of cutting the contaminated plants and burning the oil.

Soil bacteria, valuable helpers

The best solution for restoring oil-contaminated aquatic beds may lie in the use of naturally occurring micro-organisms in the soil. In fact, the sediments in which aquatic vegetation grows are already inhabited by oil-eating bacteria able to feed on hydrocarbons. Under natural conditions, however, the development of these bacteria is often limited by environmental factors. Insufficient nutrients or oxygen, for example, may hinder these bacteria's natural ability to break down hydrocarbons, thus reducing their efficiency.

Consequently, bioremediation techniques aim to provide optimal conditions for bacteria after a spill, so that the bacteria can work as efficiently as possible to eliminate the oil. Researchers working to perfect these promising techniques are therefore focussing on determining limiting factors on the optimal growth of bacteria and establishing methods to accelerate the natural restoration process by promoting bacterial growth.

Experiments on freshwater bioremediation

Since these bioremediation techniques have already been proven effective in saltwater environments, researchers at Fisheries and Oceans Canada and Environment Canada have begun a project to test this technique in fresh water. The U. S. Environmental Protection Agency and France's Centre de documentation, de recherche et d'expérimentations sur les pollutions accidentelles des eaux are also participating in the project.

The tests, which began in June 1999, are being conducted in a bulrush marsh on the eastern end of the village of Sainte-Croix-de-Lotbinière, which is located on the south shore of the St. Lawrence. Researchers created a controlled oil spill in a limited area of the aquatic bed, making up 5% of the total area of the intertidal zone at Sainte-Croix. A total of 192 L of crude oil was deliberately spilt at low tide in 16 well-isolated study plots. An emergency response team was on hand to assist the scientists in the event that the oil spread beyond the study plots during high tide.

In some of the study plots, the aquatic plants were cut back regularly to determine the effect of the presence of plants on oil decomposition rates. In other plots, fertilizer was applied beforehand to provide added nitrogen and phosphorous, nutrients that promote bacterial growth and accelerate the rate of decomposition. Nutrients not only have a direct effect on bacterial growth but also promote the growth of aquatic plants. Aquatic plants promote bacterial growth by releasing added oxygen into the soil, by excreting organic compounds into sediments and by providing micro-organisms with a support on which they can multiply.

Photo : Fisheries and Oceans Canada — P. Dionne

Photo : Fisheries and Oceans Canada — P. Dionne

Promising preliminary results

Immediately after the spill, researchers began to collect sediment samples from the plots to measure hydrocarbon content and quantify the presence of oil-degrading bacteria. Analyses were also carried out in Canadian and U. S. laboratories to assess residual toxicity levels in sediments, which are indicative of the effectiveness of bacteria in decomposing the many toxic chemicals found in hydrocarbons.

In addition, tests were carried out on animals placed in contact with contaminated sediments to determine if exposure hindered their development.

More samples will be collected in the spring of 2000. A number of additional analyses will also be required before the final results are available. In the meantime, preliminary results suggest that the American bulrush (*Scirpus americanus*), the most widespread aquatic plant at the study site, tolerates oil spills fairly well. The results also suggest that growth rates in this species, which are indicative of the level of habitat restoration, can be increased simply by adding fertilizers similar to those used in agricultural environments.

If the results from the study at Sainte-Croix-de-Lotbinière prove conclusive, the method developed could be used for spills in beds of freshwater aquatic vegetation in the St. Lawrence between Cornwall and the île d'Orléans. This will give emergency response teams a new tool to use in restoring these productive but vulnerable habitats.

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The Quebec government's agro-environmental program supporting its plant health strategy is already producing results

Implemented under Phase III of the St. Lawrence Vision 2000 Action Plan (SLV 2000), the agro-environmental program supports farm producers who wish to adopt more environmentally sound pest control programs. During the last two years, the program has provided assistance for a number of development, training and technology transfer projects. As this article explains, the results of the projects bear witness to the suitability of the approach and the energy and dynamism of participants.

Launched in 1992 by the Quebec Department of Agriculture, Fisheries and Food (MAPAQ), the plant health strategy has two objectives:

• To reduce the quantity of agricultural pesticides used in Quebec;

• To increase the area of cropland cultivated using integrated pest management, an environmentally friendly approach based on testing and observation combined with environmentally sound weed, insect and disease control practices.

Farm producers, who are the major players in implementing the plant health strategy, cannot help achieve its objectives unless they have tools to help them select and implement the most suitable management techniques for maintaining crop yields and protecting the environment. This is why the agro-environmental program, which has a total budget of $2.5 million for the period 1998-2003, puts such a strong emphasis on development, training and technology transfer projects.

Insects: friends or foes?

"The agro-environmental program has already met farm producers' expectations. Around 60 projects have been accepted up to now and many have already resulted in new tools for farmers," explains Raymond-Marie Duchesne, coordinator of the plant health strategy.

For example, a project funded under the technology transfer component of the program has led to a guide on identifying apple pests and their natural enemies (Guide d'identification des ravageurs du pommier et de leurs ennemis naturels), published by the Institut de recherche et de développement en agroenvironnement (Agro-environmental R&D Institute). Apple trees are the host for many species of insects and arachnids (such as spiders and mites). It is not easy for apple growers to distinguish between harmful pests and the beneficial insects that feed on these pests. The field guide, which is lavishly illustrated with photographs, shows over 50 species frequenting apple trees and describes each species' activity period, food preferences and potential damage. This is a practical work that is indispensable to apple growers who want to protect their trees using environmentally sound pest control methods.

Less costly options

Two other field guides on weeds and cereal pests, entitled *L'Expert mauvaises herbes — maïs* and *Le Dépisteur céréales* respectively, are helping producers make more informed decisions when planning pest control measures. In Quebec, large expanses of farmland are planted with corn and cereals, which, compared with other crops, require large quantities of herbicides. As we know, herbicides are a risk to both human health and the health of aquatic ecosystems.

Farmers have become increasingly aware that they must avoid using herbicides routinely, without considering whether they are actually needed. For example, in fields where weeds have not reached a critical level, mechanical weeding may provide a reliable alternative. This method maintains yields and protects the environment, allowing producers to save both time and money.

Both *L'Expert mauvaises herbes — maïs* and *Le Dépisteur céréales* contain practical recommendations on how and when to use mechanical weeding for corn and cereal crops. The guides also describe scouting practices and methods for rationally determining whether herbicides are needed.

Learning about new ways to do things

The agro-environmental program has also led to the creation of training programs, which are crucial if farming enterprises are to adopt integrated pest management methods. For example, the Institut de technologie agroalimentaire in Saint-Hyacinthe and the Federation of Quebec Apple Growers first made a realistic assessment of apple growers' needs, then formulated a training plan based on those needs. Participants in a recent pilot training session were very enthusiastic about the course and its relevance, which augurs well for the success of such courses in giving producers the tools they need for integrated pest management.

Training sessions will also be held for producers of potatoes and field crops such as grain, corn and soybeans, two other sectors targeted as priorities under the program. Sessions will be adapted to producers' needs and implemented using the same approach.

A big step towards reducing herbicide application rates

Of all the products of its agro-environmental program, MAPAQ is particularly proud of an initiative developed under its plant health strategy to inform farmers about the conditions required for the successful use of reduced herbicide rates on field crops. Recommended rates on labels are based on a number of factors likely to influence the effectiveness and effects of the treatment, such as weather conditions, soil type, cultivars used and the stage of development of the crop and weeds. In the case of some herbicides, an application rate lower than the recommended one can provide satisfactory results if conditions are right. This practice can be one component of a well-structured integrated pest management plan.

Quebec's agricultural producers are now being urged to adopt these new tools so they can make advances in integrated pest management and the rational use of pesticides. By participating more actively in an agro-environmental approach to plant health, stakeholders in the agricultural community will help to achieve the objectives set out in SLV 2000 on improving the health of the major drainage basins of the St. Lawrence.
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www.agr.gouv.qc.ca/dgpar/agroenv/strategie-slv.html

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Chronicle
ZIP Committees in the Heat of the Action

Rive Nord de l'Estuaire ZIP Committee

Tools for protecting and enhancing shoreline habitats

The territory of the Rive Nord de l'Estuaire ZIP Committee (ZIP stands for Area of Prime Concern) covers 365 km of shoreline along the St. Lawrence estuary. However, except for the Saguenay–St. Lawrence Marine Park, this shoreline is completely unprotected in terms of ensuring the conservation of resources. Given the increased pressure on shoreline habitats, the ZIP Committee, under its Ecological Remedial Action Plan (ERAP), has chosen to support a number of projects that contribute to the protection and sustainable development of habitats The committee is also launching a guide for community groups and agencies responsible for managing these sites and a study on an innovative new method for restoring beach habitat.

Consultations with local citizens carried out in 1996 revealed seven sites of interest in the ZIP committee's territory, between Tadoussac and the Pointe des Monts (in the village of Baie-Trinité). Most of these sites are frequented by local citizens and host more or less organized activities, some of which disturb the natural environment.

In the spring of 1999, the ZIP committee mandated the firm Naturam Environnement to draw up an inventory of shoreline habitats within its territory and produce a guide describing these habitats and guidelines for their sustainable development. Six additional habitats were added to the original seven, to make a total of 13.

Photo : Comité ZIP rive nord de l'estuaire

A preliminary guide rich in information

During the summer of 1999, literature searches, photointerpretation and field surveys were carried out to gather and validate information on shoreline habitats. This work led to the publication a few weeks ago of the preliminary version of the Guide d'intervention en matière de protection et de mise en valeur des habitats littoraux d'intérêt (Guide to Protecting and Enhancing Valuable Shoreline Habitats). The project received financial support from the Quebec Department of the Environment, Environment Canada, Fisheries and Oceans Canada, Human Resources Development Canada and the local group Comité Côtier Les Escoumins — Betsiamites.

"Each site is described in a fact sheet which documents both the biophysical and human aspects of valuable habitats," explains Nicolas Roy, the ZIP committee coordinator. A relative ecological value is assigned to each site and current and past sources of disturbance are also noted. The conservation and enhancement potential of each site, and the associated constraints, are also defined. Based on this information, guidelines on the sustainable development of the shoreline habitat in question are also provided.

Consultation, a winning formula for the ZIP committee

"We are planning to submit the guide to the community to get feedback on its content," Roy explains. To this end, the committee has organized a round of consultations with the representatives of local groups and municipal administrations. "Once the consultation process has been completed, we will integrate a summary of comments from our partners into each fact sheet and

the minutes of each meeting will also be included in the guide," he added. This will allow riverside communities to participate in producing the final version of the document, so that it can be more easily used by the stakeholders for which it is intended.

The round of consultations will also be used to inform regional representatives of an upcoming training session on managing valuable habitats. "The sessions could deal with a number of subjects, particularly current conservation measures and available funding sources," said Roy. The consultations will also allow the representatives of the groups concerned to propose subjects that they would like to discuss during the training session, which is being offered thanks to financial support from the Quebec Wildlife Foundation.

An innovative method of beach restoration under study

Another project targeting such things as the protection of shoreline habitats and shorelines has been received enthusiastically in the region. Thanks to funding from the Community Interactions program, the ZIP committee has launched a study of a beach restoration technique developed by two local citizens, Lucien Maltais, a retired fisherman, and Jean-Pierre Savard, an audiovisual technician. For eight years, the pair have been working on an innovative technique for restoring beachfront. Hydro-Québec, the Pointe-aux-Outardes Nature Park, Public Works and Government Services Canada, the Manicouagan RCM and the Institute of Ocean Sciences (IOS) have agreed to participate in the innovative project.

A geomorphologist in the region recently prepared a report on the development of the method and the impact of storms on the stabilization structures designed by Maltais and Savard. Several weeks ago, IOS began a study on the hydraulic behaviour of the structures. In June, restoration work will be carried out at Baie-Saint-Ludger and along the shoreline of the Pointe-aux-Outardes Nature Park. The results will be monitored to determine the effectiveness of the method.

At the end of the project, the bank erosion working group formed by the ZIP committee could recommend the use of the technique throughout the ZIP's territory, while disseminating information on the technology in Quebec and elsewhere in the world. IOS already foresees the technique being used in other parts of the world, particularly in Morocco and Tunisia.

The Rive Nord de l'Estuaire ZIP committee's activities have a common objective, whether they involve producing a management guide, holding a training session or validating a shore restoration technique to determine if it is suited to local conditions. This objective consists in providing riverside communities with the tools they need to participate actively in the environmentally sound management of shorelines and thus contribute to achieving a balance between the conservation and development of resources.

Source:

NATURAM ENVIRONNEMENT, 2000. Guide d'intervention en matière de protection et de mise en valeur des habitats littoraux d'intérêt, Version préliminaire, submitted to the Rive Nord de l'Estuaire ZIP Committee, 250 pages.

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News in BRiEF

Climate Warning

On June 5, Environment Canada's Biosphere, which has celebrated its fifth birthday in June, launched its 2000 summer program with a new exhibit on climate change. "Climate Warning" will be on display until April 1, 2001.

The exhibit features a number of themes giving visitors a better understanding of climate change and its impact on daily life, particularly in terms of the quality and availability of water in the St. Lawrence–Great Lakes ecosystem. A must see!

For more information, visit http://biosphere.ec.gc.ca

Naviguer sur le fleuve au temps passé, 1860-1960

Les Publications du Québec announces the sixth title in its popular series, Aux limites de la mémoire, entitled "*Naviguer sur le fleuve au temps passé, 1860 – 1960*." It was written by Alain Frank, a ethnologist specializing in maritime history.

The book tells the story in words and pictures of the relationship between the people that live along the St. Lawrence and the river itself. This is done through themes such as shipbuilding, coastal shipping, shipwrecks, passenger transport, lighthouses, wharves and other human activities along the river. The book contains roughly 196 black and white photos gleaned from archival collections from across Quebec.

The book is on sale in bookstores since June 3, for $29.95. Happy reading!

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