

Great Lakes - St-Lawrence River System

The Great Lakes are the largest natural freshwater reservoir in the world; together with the St-Lawrence river valley they are geographically located near the historic heart of North America and represent half of the total US-Canada border. They are central to North American environment, economy and security concerns:

- Health & Environment:
 - Watershed drains one tenth of eastern North America (1.35 million sq km);
 - Food production & transport, recreation, wildlife, electric energy, mining & forestry, industrial production and transport;
 - Critical habitat for many aquatic, bird and animal species;
 - Potable water to half of Canada's citizens and to 30 million Canada/USA citizens including 15 major urban areas.
- Economy:
 - Seaway international transport connection with industrial heartland of Canada & US;
 - Supports over 25% of Canada's agriculture, over 45% of Canada's industry, and a fishery worth almost a half-billion dollars a year¹.
- Security:
 - Half of the US-Canada border, and straddled by customs-free Indian reserves in places, encouraging contraband (drugs, alcohol, cigarettes and weapons); no systematic surveillance of maritime traffic; identified in Senate Report as significant and National Security Policy as security risk.



Satellite map of the Great Lakes, courtesy of Barbara Spring

In 1988 and 1989, the federal and provincial governments of Canada, Quebec and Ontario announced the creation of action plans to address long-term rehabilitation of the watershed. Great Lakes Action Plan (2000-2005):

- 3 main goals: healthy environment, healthy citizens, sustainable communities;
- 7 objectives: restore Areas of Concern, conserve ecologically important areas, control introduction of exotic species, assess and manage ecosystem health, protect and promote human health, reduce harmful pollutants, advance sustainable use.
- Restore environmental quality in Areas of Concern and protect human health and environmental quality;
- Address challenges of increasing importance, including the introduction of exotic species and the impacts of human health and development;
- Address root causes of many of the stresses the environment and human health in the Great Lakes Basin through tangible progress on sustainable development;
- \$228 million spent since 1990; significantly more in US; current estimate of required Canadian funding to address remaining Areas of Concern \$1.9 billion.

St-Lawrence Vision 2000 (formerly St-Lawrence Action Plan):

- Launched in 1988, the St. Lawrence Action Plan was the realization of a vision shared by Canada and Quebec with respect to protecting the health of the river ecosystem, safeguarding human health and involving riverside communities in the cleanup of the St. Lawrence River;
- Phase I (1988-1993) focussed on Industrial clean-up, Phase II (1993-1998) took a more Ecosystem-oriented approach and Phase III puts emphasis on community involvement;
- 6 main objectives in relation to biodiversity, industrial sector, health, agriculture, navigation, water level management;
- \$303 million spent in Canada for Phase III alone.

¹ Environment Canada <http://www.on.ec.gc.ca/laws/coa/coa-portraits-e.html>

“Hot” issues:

- GL Water Quality and Levels;
- Invasive aquatic species entering GL in vessel ballast water;
- Industrial effluents affecting air and water quality in watershed IJC “International Air Quality Advisory Board” (IAQAB);
- Sustainable water levels in GL and St Lawrence River:
 - Bulk Water removal (city of Chicago);
 - Changes to St Lawrence Seaway affecting drainage rate;
 - Climate Change impacts on water levels (electricity, transport, drinking).
- Sustainable St Lawrence ecosystem management “Centre St Lawrence – EC” “Canadian Environmental Protection Act – EC”;
- Minimizing agri-business impacts on freshwater resources in GL and SL watershed (i.e. hog production, chemicals, tillage practices, shore line vegetation);
- First Nations access to and management of natural resources within watershed;
- Cross Border Security against unwanted activities;
- North America security emphasis on protecting against Chemical, Biological or Radiological threats to our mutual water resources.

Key players

Environment Canada, <http://www.ec.gc.ca>

The **St. Lawrence Centre** is concerned with St-Lawrence ecosystem health, including how variations in water levels affect plant and animal communities, water and sediment contamination and land use.

Agriculture and Agri-Food Canada seeks to implement sustainable agricultural practices and avoid harmful run-off into water systems. <http://www.agr.gc.ca>

Other key players include Fisheries and Oceans Canada, Health Canada, Natural Resources Canada, Parks Canada, Public Works and Government Services Canada, Transport Canada

Ontario and Quebec governments.

U.S. Environmental Protection Agency (EPA) <http://www.epa.gov/glnpo>

U.S. Department of Homeland Security <http://www.dhs.gov/dhspublic>

U.S. Fish and Wildlife Service <http://www.fws.gov/>

U.S. Coast Guard <http://www.uscg.mil/USCG.shtm>

Bordering state government agencies in Michigan, Illinois, Wisconsin, New York and Ohio are responsible for regional and local clean-up and management initiatives;

The **International Joint Commission** established in 1909 is charged with overseeing Canada-US border environmental resource and security issues. <http://www.ijc.org>

Great Lakes Fishery Commission (GLFC) <http://www.glfc.org/>

Council of Great Lakes Governors <http://www.cglg.org/index.asp>

North American Agreement on Environmental Cooperation (NAAEC) is responsible for environmental issues arising from the North American Free Trade Agreement. <http://www.cec.org>

International Council for the Exploration of the Sea (ICES) <http://www.ices.dk>

Northwest Atlantic Fisheries Organization (NAFO) <http://www.nafo.ca>

Great Lakes Commission <http://www.glc.org>

North Atlantic Salmon Conservation Organization (NASCO) <http://www.nasco.int>

Space and the Great-Lakes-St-Lawrence River System

Canada has EO sensor and satellite systems expertise which can be used to provide water quality and environmental change detection to provide information for guiding human activities to achieve sustainable high quality fresh water resources in Canada.

In April 2002, Ontario announced it is investing \$50 million over five years to clean up the Great Lakes and protect the province's unique coastal environment. The priorities identified provide clues to how space may be relevant:

- support the clean up of contaminated sediment in Ontario's Great Lakes Areas of Concern;
- increase the monitoring and reporting of water and sediment quality, as well as the health of fish and wildlife in and around the Great Lakes;
- reduce the amount of harmful pollutants, such as mercury, that find their way into the Great Lakes;
- integrate information from both governments and stakeholders to ensure better decisions are made and appropriate actions taken; and
- make progress on habitat rehabilitation, conservation and protection.

The **St. Lawrence Centre** (SLC) is the only federal research and development centre devoted entirely to the river ecosystem. Its specialists are involved in a multitude of studies and research programs aimed at better understanding how the ecosystems of the St. Lawrence River function and to keep this knowledge up to date. The major programs of the St-Lawrence Centre are:

- Monitoring the state of the St-Lawrence
- Impacts of Water Level and Flow Fluctuations in the St. Lawrence River
- Urban Effluents
- Long-Range Transport of Airborne Pollutants (LRTAP)

The St-Lawrence Centre uses Remote Sensing to view multiple facets of the St. Lawrence River and to conduct large-scale studies to characterize and monitor changes in wetlands along the river, study riverbank erosion, assess sediment transport and analyse the behaviour of water masses in the river. The CSA works with the St-Lawrence Centre in the context of GRIP (wetland monitoring).

St. Lawrence Centre specialists employ geomatics and digital mapping to define the relations among different kinds of information: how variations in water levels affect plant and animal communities, for example, or water and sediment contamination or even land use and occupation.

Issues for the CSA:

- Satellite Earth Observations and Communications systems for monitoring and sustainable management of the environmental resources of the Great Lakes and St Lawrence watershed on an ecosystem basis;
- EO data and derived information to enhance cross boarder security;
- In this year's budget (2004) the Government committed 3.5 billions \$ over 10 years to accelerate the cleanup of sites for which the Government of Canada is responsible;²
- The Government also promised to invest at least \$1 billion in environmental technologies over the next seven years. It will increase "the funding for Sustainable Development Technology Canada by \$200 million and expand its mandate so that it can address issues of clean water and soil;"³
- "The Government will intensify its commitment to clean air and clean water. We will engage the United States on trans-boundary issues and the provinces to achieve more stringent national guidelines on air and water quality."⁴

² The Budget Speech 2004, Department of Finance Canada, p. 15

³ The Budget Speech 2004, Department of Finance Canada, p. 16

⁴ Speech from the Throne to Open the Third Session of the Thirty-Seventh Parliament of Canada, February 2, 2004, p. 19

Related themes:

Cities and Urban Issues
Disasters
Energy and Mineral Development
Environmental Factors affecting Health
Sustainable Agriculture
Sustainable Water Resources

References:**Basic information:**

St. Lawrence Centre http://lavoieverte.qc.ec.gc.ca/csl/acc/csl001_e.html

Latest update:

International Joint Commission <http://www.ijc.org/>

Ontario Ministry of the Environment (MOE) <http://www.ene.gov.on.ca/envision/water/greatlakes/index.htm>

Ontario Ministry of Natural Resources <http://www.mnr.gov.on.ca/MNR/water/p741.html>

Quebec Ministry of the Environment http://www.menv.gouv.qc.ca/index_en.asp

Quebec Ministry of Natural Resources <http://www.mrn.gouv.qc.ca/english/home.jsp>

Public Safety and Emergency Preparedness Canada (OCIPEP) <http://www.ocipep.gc.ca/index.html>

Closer look:

SPRING, Barbara, *The Dynamic Great Lakes*, America House Book Publishers, 2002, 108pp

Status of Restoration Activities in Great Lakes Areas of Concern: A Special Report, April 2003, Report of the International Joint Commission

International Agreements and Legislation:

Great Lakes Water Quality Agreement;
Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA);

Relevant Canadian legislation:

Canada: Fisheries Act, Canadian Environmental Protection Act, Canadian Environmental Assessment Act, Canada Water Act, and others.

Ontario: Ontario Water Resource Act, Safe Drinking Water Act, the Pesticides Act, Nutrient Management Act, Environmental Protection Act as well as other statutes and permitting processes relevant to restoring Great Lakes water quality, Municipal Industrial Strategy for Abatement regulations, hazardous waste regulations.

Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem contributes to Canada meeting its commitments under the Great Lakes Water Quality Agreement including those for Areas of Concern