

## **FRESHWATER COUNTRY PROFILE\***

### **CANADA**

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\* This document is based on information submitted and reviewed by the Government of Canada.

## **Introduction**

Canada has substantial water resources and a range of water resource management challenges. Many actions to meet these challenges reflect the increasing use of integrated water resource management approaches for freshwater environments. Canadian researchers are helping to strengthen these actions by building the knowledge base that enables Canadians to use water more productively. Canada is working with countries and communities around the world to share this expertise and experience. These efforts are helping to meet global commitments to cleaner water and integrated management worldwide.

## **Sustainable Development**

In Canada, sustainable development is the jurisdictional responsibility of all levels of government. In order to ensure that work toward sustainable development at all levels of government is mutually supportive and has a common goal, various mechanisms have been implemented. A key mechanism is the Canadian Council of Ministers of the Environment (CCME). It plays a role in encouraging better information collection and brings together environment ministers from the federal, provincial, and territorial governments for discussion and joint action on environmental issues of national and international concern. At the local level, the Federation of Canadian Municipalities (FCM) promotes sustainable community development that supports information sharing and networking among municipalities.

Public consultation is a key element of the sustainable development strategies required of all level of governments. For the federal government, the federal Minister of Finance receives advice in the form of pre-budget submissions from environmental groups, business, and other interested parties on various ways to integrate environmental considerations into the budget process. The National Round Table on the Environment and the Economy (NRTEE) takes an impartial, inclusive approach, with open and free debate, to issues related to the environment and the economy. The Youth Round Table on the Environment gives Canadian youth, from a range of backgrounds, perspectives and values regarding sustainable development, and offers an opportunity to participate in the dialogue.

Each department within the federal government is responsible for developing and implementing its own three-year sustainable development strategy. The federal Minister of the Environment tabled in the House of Commons the Sustainable Development Strategies of 29 federal departments and agencies in February 2004. To facilitate a strategic and integrated federal approach to water issues, an interdepartmental water committee was struck in 2003 and has developed a Federal Water Management Framework. The framework embraces a vision of clean, safe, and secure water for people and ecosystems.

## **Decision-Making**

The governance of water issues in Canada is complex and multifaceted. Water resources within provincial boundaries are under the direct control of provinces, which bear the most responsibility for the day-to-day management of water. On federal and Aboriginal lands, however, management is the responsibility of the federal or Aboriginal government. The delivery

of drinking water and sanitation services is generally delegated by provinces to municipalities, with varying levels of provincial funding and oversight. Moreover, all levels of government hold key policy levers which apply to water management. In practice, all orders of government, communities, the private sector and individual Canadians have responsibilities to make decisions every day that influence the health and sustainability of freshwater, coastal, and marine resources. There is a steady and increasing collaboration on water issues. International aspects of water management are led by the federal government, and transboundary Canada-US waters are managed through the International Joint Commission.

The Canadian constitutional head of power relevant to water management is as follows:

<b>Federal Government</b>	<b>Provincial Government</b>
<ul style="list-style-type: none"><li>▪ Navigation and shipping</li><li>▪ Seacoasts and inland fisheries</li><li>▪ Federal works and undertakings</li><li>▪ Canals, harbours, rivers, and lake improvement</li><li>▪ Indians and lands reserved for Indians</li><li>▪ Concurrent jurisdiction over agriculture</li><li>▪ Spending</li><li>▪ Criminal law</li><li>▪ Peace, order and good government</li></ul>	<ul style="list-style-type: none"><li>▪ Local works and undertakings</li><li>▪ Property and civil rights in the province</li><li>▪ Municipal institutions</li><li>▪ Exclusive jurisdiction over the development, conservation, and management of non-renewable resources</li><li>▪ Concurrent jurisdiction over agriculture</li></ul>

In order to prevent pollution of water resources, the federal government develops regulations under the Canadian Environmental Protection Act to control the release of toxic substances, and under the Fisheries Act to control the release of deleterious substances into water. Canadian provinces and territories have the primary jurisdiction over most areas of water protection and management, including some authority over shorelines to the low water mark and some marine areas. Most major uses of water in Canada are permitted and/or licensed under provincial water management authorities.

Canada has established numerous institutional arrangements that bridge these areas of responsibility. These include the Prairie Provinces Water Board (composed of Alberta, Saskatchewan, and Manitoba, and Canada), the Fraser Basin Council, the Mackenzie River Basin Board (composed of Canada, British Columbia, Alberta, Saskatchewan, Yukon, Northwest Territories, and Aboriginal representatives) conservation authorities, and others. These governance arrangements seek to coordinate the activities of all actors within defined watersheds by developing consensus priorities and coordinate action plans – these are the vanguard of integrated water resource management in Canada.

In addition, new federal legislation has been promulgated in the last decade in Nunavut, the Northwest Territories, and Yukon, which has revised previous regulations and authorizing process to control the release of waste into freshwater. Since April 2003, the responsibility for water resources has been devolved to the territorial government in Yukon.

In the keynote speech at the Governments' Round Table on Water in January 2000, governance was identified as the key issue facing water management in Canada. The traditional roles of

provincial and federal governments were outlined, and it was noted that the role of non- and para-governmental organizations in the delivery of water-related programs increased as governments downsized. The management of water in Canada requires collaborative approaches among all of these actors.

In the 2004 Speech from the Throne, the federal government announced that it will intensify its commitment to clean water; it is committing the resources needed to ensure safe drinking water in First Nations' communities; it will engage the United States on transboundary issues and the provinces to achieve more stringent national guidelines on water quality; and it will start incorporating key indicators on clean water into its decision making.

#### *Evolution of provincial water policies and strategies in Canada*

Provincial policies vary to a significant degree in the adoption of the principles of integrated water resource management (IWRM). Most are highly compatible with the Federal Water Management Framework. In general, the recent provincial policies have the following key characteristics:

- ***Rooted in sustainable development***, they provide a solid context for the water policies to expand beyond drinking water and human health and include ecosystem needs and sustainability.
- ***Protection of human health is a key outcome***. This is understandable given that many policies are rooted in response to drinking water contamination in Walkerton and North Battleford.
- ***Half of the provinces identify protection of ecosystem health*** as a key outcome. A number of provinces, particularly in the Atlantic region, are focused primarily on protecting only drinking water and do not explicitly identify broad-based ecosystem protection as a tool. Although New Brunswick does include ecosystem protection, it is limited to watersheds that serve as a source for municipal drinking water. Protection of ecosystem health may be addressed under separate legislation or policy in these provinces.
- ***The international dimension is limited in scope*** and discussed briefly in the context of preventing bulk water removals. In addition, limited focus is also given to meeting international and interprovincial agreements.
- ***Most provinces have developed a water strategy or policy to guide their water management (Alberta, Saskatchewan, Manitoba, Ontario, and Quebec)***. In the remaining provinces comprehensive approaches to water management have not yet been developed. Attention to water resources is typically focused on drinking water.
- ***Hazards and environmental prediction are identified in only half*** of the provinces and are typically limited to flood damage protection.

- *Education is identified in many of the provincial water policies as a key outcome.*
- *The provinces of Alberta, Manitoba, Ontario, and Quebec all include specific governance mechanisms in their policies to guide the implementation of watershed-based integrated water resource management.* They typically included a nested set of watershed-based boards with regional and local sub-boards. The boards are designed with transparency and to provide stakeholder participation.

## **Integrated Water Resources Development and Management**

Frequently, no single jurisdiction controls all of the levers necessary for effective action on a given water issue. The Canadian Council of Ministers of the Environment (CCME) is a formal mechanism to facilitate collaboration on regional, national, Canada-US, and international issues. New models for collaborative action on water continue to gain acceptance, including ecosystem-based and Integrated Water Resource Management (IWRM) approaches to water management. The Ecosystem Initiatives and the National Programme of Action for the Protection of the Marine Environment from Land-based Activities (NPA) are examples of such collaborative action. In addition, the role of citizens and the private sector needs to be explored further in the context of collaborative partnerships. In particular, there may be opportunities to promote well-governed public-private partnerships in water management.

Governments have not traditionally addressed water issues on a comprehensive local basis. In Canada, geographical and constitutional boundaries of government jurisdiction do not easily align with a watershed approach to managing water resources. Ontario has been using watershed-based conservation authorities for decades. In the wake of Walkerton and North Battleford, however, and following the lead of some innovative European countries, provinces such as Quebec and Alberta are developing watershed-based management models that are among the best in the world.

To manage Canada's water resources, the federal government seeks to protect and enhance the quality of the water resource, and to promote the wise and efficient management and use of water through enhanced collaborative governance. Canada has moved to integrated watershed and coastal management approaches to ensure that decision-making balances a range of goals and reflects the interests of many stakeholders. Many provincial governments are implementing watershed and coastal management planning or have made commitments to do so in recently released water policies.

Canada is promoting integrated watershed planning in several ways. A technical guidance document on the multi-barrier approach to protecting water quality from source to tap has been developed with CCME and federal/provincial/territorial health departments. The federal government works with provinces and territories, municipalities, Watershed Boards, and Conservation Authorities on activities such as the possible establishment of a community of practitioners and identifying best management practices at the watershed level.

Federal and provincial governments are implementing basin-wide action plans in collaboration with communities and other stakeholders. Key examples are the St. Lawrence River Action Plan

and the Great Lakes Action Plan. These initiatives are designed to help resolve complex environmental issues, such as the effect of poor water quality on human and ecosystem health.

Canada's National Programme of Action for the Protection of the Marine Environment from Land-based Activities benefits from collaborative federal-provincial-territorial governance to achieve integrated water management that protects the marine environment from contaminant pollution and habitat alteration and physical destruction. It is the only national programme that addresses the interface between fresh and saltwater, river basin and coastal environments and habitats while incorporating the principles of integrated coastal management within IWRM. Implementation of the NPA involves using sustainable and integrated environmental management, as well as other approaches such as the harmonization of integrated coastal and river basin management and land-use planning.

IWRM, which incorporates a watershed-based approach, is "a process which promotes the coordinated development and management of water, land, and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems," according to the Global Water Partnership.

IWRM is not an end in itself but a means of achieving three key strategic objectives: efficiency to make water resources go as far as possible; equity, in the allocation of water across different social and economic groups; environmental sustainability, to protect the water resources base and associated ecosystems.

In terms of governance, a key feature of IWRM is its "bottom up" approach, which differs from traditional resource-based management. It emphasizes the building of capacity among users, and represents an enormous shift in traditional governance models regarding water. The following provides a brief description of many of the non-government actors and how they participate in a Canadian context.

*Local Authorities:* Canada views the role of local authorities as critical in achieving sustainable development, both nationally and internationally. Canadian municipalities have taken a leadership role in developing a high quality of community life that includes respect for the needs of both economic development and environmental protection. Many municipalities in Canada have adopted environmental initiatives. Local authorities generally include environmental and social considerations in their official plans, planning by-laws, and general policies. Most of these local authorities involve representation of women and/or youth. It is not possible to accurately estimate the percentage of the population involved in the decision-making process, as most of main debates are discussed in public consultations. Governments generally support local *Agenda 21* initiatives.

*Public Participation and Involvement:* One of the key non-government organizations that supports public consultation and participation in environmental management is the Canadian Environmental Network (CEN). The CEN is a national network of over 700 community-based, national and regional environmental organizations, and provides a consultation mechanism for capacity-building within the broader environmental community. National and provincial roundtables are another example of coalition-building institutions that identify, explain and promote the principles and practices of sustainable development. The National Round Table on

the Environment and Economy is an independent agency of the federal government, committed to providing decision makers and opinion leaders with reliable information and objective views on the current state of the debate on the environment and the economy. Members are Canadians representing a broad range of regions and sectors. A 1998 Consultations Directive requires federal departments to identify in each Memorandum to Cabinet the key stakeholders consulted, the consultation process employed, the outcomes, and any follow-up consultations planned as part of the implementation of a policy. The federal document *Policy Statement and Guidelines on Consulting and Engaging Canadians* recognizes that in order to serve Canadians, a “citizen focus” must be built into all its activities, programs and services. An integral component of this service is providing information to citizens, and consulting and engaging citizens in the policy development process. The policy statement and guidelines explore new ways in which governments will be able to consult and engage Canadians. Other non-governmental structures also play a key role in Canada’s environmental management regime.

*Self-government and co-management agreements:* The Government of Canada recognizes the inherent right of self-government as an existing right within section 35 of the *Constitution Act, 1982*. Recognition of this inherent right is based on the view that Aboriginal peoples of Canada have the right to govern themselves in relation to matters that are internal to their communities, integral to their unique cultures, identities, traditions, languages and institutions, with respect to their land and resources. A number of co-management boards have been established, usually within the context of a land claim or self-government agreement, to facilitate the participation of Aboriginal communities in the stewardship of forests, water and wildlife resources such as caribou, whales, and fur-bearing animals. For instance, the *Nunavut Agreement* (1993) requires that communities nominate holders of traditional knowledge to make up fifty percent of the members of the wildlife co-management board.

Within the Comprehensive Claims process for Aboriginal interests, in the North, all agreements have some degree of co-management of resources (particularly wildlife), e.g. Inuvialuit Final Agreement (1984), the Gwich’in Agreement (1992), the Nunavut Land Claims Agreement (1993), the Sahtu Dene and Metis Agreement (1994), and the Council of Yukon Indians Umbrella Final Agreement (1993). Other agreements are still being negotiated, and reflect the tendency that the more recent the settlement, the greater the degree of self-governance agreed on.

*Women:* The full participation of women as equal partners in the sustainable development of their societies is one of six priorities of Canada’s *Official Development Assistance* program. It is supported through initiatives that advance women’s equal participation with men as decision-makers; support women and girls in the realization of their full human rights; and reduce gender inequalities in access to and control over the resources and benefits of development.

Within Canada, part of *Canada’s Women’s Health Strategy* is the reduction of environmental hazards that threaten women’s health. Under this strategy, Canada will accelerate screening and assessment of new and existing substances, improve management and control of toxic substances, and track progress. Canada recognizes the key role that indigenous women play in environmental health, and their sensitivity to environmental change.

*Children and Youth:* Youth are involved in environmental and sustainable development issues in Canada through many channels. Since 1992, young people and partners from youth and student groups, governments, non-governmental organizations, education associations, and individuals have been active in hands-on sustainable development projects, curriculum and policy change, and awareness campaigns to help implement *Agenda 21*. The National Youth Round Table on the Environment was created in 1997 to promote dialogue and involvement of youth in the policy making process. The Youth Round Table on the Environment has been involved in many consultations on programs and policy within Environment Canada and continues to play its role as a youth advisory body for the Minister of the Environment and Environment Canada staff. Engaging children and youth in sustainable development is a key challenge for the future of Canada and all countries. Emphasis is placed on children and youth as a target group for a variety of educational programs and initiatives.

*Farmers:* The Agricultural Environmental Stewardship Initiative (AESI) contributes to environmental stewardship by addressing national, environmental priority issues such as water quality, soil health, wildlife habitat and biodiversity, and greenhouse gas emissions through education and awareness, technology transfer and stewardship tools. The program builds on the regionally-sensitive National Soil and Water Conservation Program model and complements the other national environmental initiatives focusing on climate change, wildlife habitat and livestock issues.

*Workers and Trade Unions:* Labour organizations are represented on Canada's National Roundtable on Environment and Economy, providing advice to the federal government and stakeholders across the country on sustainability issues. A recent initiative of the Roundtable is the development of sustainability indicators, intended to be used in a variety of activities, including the federal budgeting process. In Canada, labour groups take part in national *Agenda 21* discussions and implementation. Labour has focused attention on linking environmental issues to more traditional issues of workplace health and safety. Labour groups have played an important role in improving the environmentally sound management of chemicals in Canada, promoting the adoption of high national standards of environmental protection especially in pollution prevention. Canadian unions have also worked for the establishment of environmental rights such as joint labour-management environment committees in workplaces, the legal right to refuse to pollute and "whistle -blower protection" for workers reporting environmental violations.

*Business and Industry:* Business organizations play a key role on Canada's National Roundtable on Environment and Economy, providing advice to the Federal Government and stakeholders across the country on sustainability issues. Federal policies encourage increasing the efficiency of resource use, including reuse, recycling, and reduction of waste per unit of economic output. The *Accelerated Reduction/Elimination of Toxics (ARET)* is an example. Under this program, 316 facilities from companies and government organizations reduced their emissions of 117 toxic substances by 67 per cent of 1993 levels. A second program will aim to echo the success of ARET.

*Science for Sustainable Development:* The federal government uses inclusive "science advisory bodies" to gain science input into its decision-making. *Science and Technology for the New*

*Century: A Federal Strategy*, was adopted in 1996. It involves a committee of Assistant Deputy Ministers to coordinate government-wide approaches to managing Science and Technology (S&T) and to ensure that departmental initiatives and priorities are shared across the federal science and technology community. The *Advisory Council on Science and Technology*, with eminent representatives from industry and academe, reviews the nation's performance in S&T and provides the Prime Minister with expert, non-partisan advice on national science and technology goals and policies and their application to the Canadian economy. The *Council of Science and Technology Advisors* (CSTA) provides the federal government with expert advice on science and technology issues requiring strategic attention.

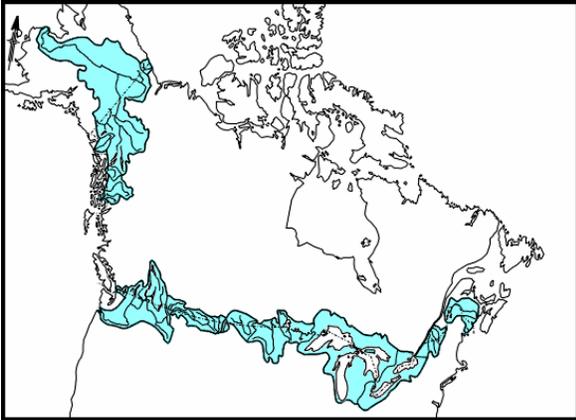
Under the auspices of the Canadian Council of Ministers of the Environment (CCME), the National Water Research Institute (NWRI) led a series of workshops on water topics considered priorities by the provinces with the general theme of bridging water science and water policy. Across Canada, NWRI researchers investigate threats to freshwater, and has held workshops involving federal, provincial, territorial, and municipal representatives to share important research findings, and to provide a forum for policy makers to give input to the scientific community. At a recent workshop, provincial and territorial representatives identified five issues for discussion: impacts of agricultural practices on water quality; groundwater quality; water reuse and recycling; wastewater treatment for small communities; and water quality monitoring.

### **Canada-United States Boundary and Transboundary Waters**

The *Boundary Waters Treaty of 1909* between Canada and the United States sets out the principles and procedures under which waters along the border are to be shared. The *Treaty* established the International Joint Commission (IJC), consisting of six members, three from each country.

Canada contributes to capacity-building and the strengthening of institutional and human resource development in developing countries in the area of water use for agricultural and domestic purposes.

A special case of the governance challenges facing domestic water management are the transboundary waters that cross the border between Canada and the United States. The Great Lakes–St. Lawrence River system and major rivers such as the Columbia, Yukon, Red, and Saint John are among the almost 300 waterways and aquifers that cross or form the Canada–US border. The figure below shows that Canada shares many coastal and estuarine and freshwater ecosystems with the US (e.g., Gulf of Maine and Puget Sound). The majority of the Canadian population lives within these watersheds, with much of Canada's economy directly dependent on the industrial, agricultural, transportation, and recreational benefits these resources bring.



**Canada–United States boundary waters.**

*Source: Environment Canada.*

Traditionally, boundary and transboundary waters have been managed to protect navigation, hydroelectric and irrigation interests, as well as to meet the domestic and sanitary needs of communities dependent on these waters. Today, management of shared waters is increasingly reflecting the ecosystem approach through such action programs as Great Lakes Action Plan, the St. Lawrence Action Plan, and the Georgia Basin Action Plan.

Periodically, major issues arise that require special attention. A growing threat is posed by invasive aquatic species to the Great Lakes basin ecosystem, already one of the most heavily impacted aquatic ecosystems in the world. The number of invasive species in the basin, now estimated at 160, is expected to rise because of various factors, including increased global trade, new diversions of water into the lakes, aquaculture industries, and climate change. The International Joint Commission has requested that governments refer this issue to them for review.

In an effort to alleviate flooding problems in Devils Lake, the State of North Dakota and the US Army Corps of Engineers have been actively pursuing a widely criticized plan to build a canal and drain Devils Lake, which has no natural outlet, into the Hudson Bay system through the Sheyenne and Red rivers. Manitoba and Canada have, along with other opponents, been active in normal domestic processes trying to stop the project, based on objections that it will introduce exotic species and biota into the Red River system and that it violates the Boundary Waters Treaty.

In most cases, transboundary issues are addressed and resolved through bilateral cooperation, often using existing mechanisms involving federal, provincial, and state governments of both countries. In some instances, a comprehensive investigation is required in order to develop recommendations to best address a cross-border issue in an integrated and coordinated manner. Such was the case in the aftermath of the 1997 Red River flood, where the governments of Canada and the United States asked the IJC to conduct a thorough study as a basis for recommending structural and non-structural measures to prevent or reduce future flood damages.

*Multilateral Environmental Agreements*

Within Canada the distribution of responsibility between federal, provincial and territorial governments for sustainable development issues is shared. While the federal government conducts international treaty negotiations on behalf of Canada, implementation of international agreements falls to the level of government that has constitutional jurisdiction over the subject matter. Consequently, consultative structures are needed across all levels of government during both negotiations of MEAs and during implementation phases. Within the federal government, each minister is responsible for sustainable development within his or her department, and for submitting updates of their sustainable development strategies every three years in accordance with the *Auditor General Act*. Apart from carrying out consultations across all levels of government, the federal government consults widely among civil society stakeholders (such as Aboriginal communities, youth, industry, non-governmental organizations) about the negotiation, ratification and implementation of international legal instruments relating to sustainable development and the environment. Further, Canadian delegations to international negotiations routinely include aboriginal, industry and NGO representatives, as well as provincial and territorial representatives. Where appropriate, youth delegates are also included.

## **Water Issues**

### **A) Water Resources Assessment**

In Canada, water quality monitoring is carried out within partnerships amongst provincial, territorial, and federal governments, municipalities, universities, water associations, environmental groups and volunteers. In general, provinces conduct much of the water quality monitoring within their boundaries. The federal government's monitoring focuses on inter-provincial and international boundary waters (e.g., Great Lakes) and other areas of federal authority (i.e., Territories, National Parks, and other federal lands). Monitoring of recreational waters is generally carried out by local municipalities. Monitoring of tap water, delivered through municipal supply systems, is also usually undertaken by local municipalities, often in partnership with provincial agencies.

Responsibility for assessing and managing water quality and aquatic ecosystem health is shared by all levels of government, with significant contributions by industry, academe, and non-government organizations. Due to this wide range of practitioners, there are many water quality-related programs, activities and partnerships.

At their May 2001 meeting, the Canadian Council of Ministers of the Environment (CCME) agreed to better link existing water quality monitoring networks to ensure that Canadians have access to comprehensive information on the quality and safety of water. Building on their 2001 commitment to clean, safe and secure water for all Canadians, in November 2003 CCME reaffirmed water issues as a priority, and agreed to explore conservation measures, including economic considerations, public education and the need for better information.

Water quality is closely monitored in Canada. It is difficult, however, to make an aggregated assessment of water quality across the country because of diverse physical geography and demographics, and a lack of common standards for water quality monitoring and reporting.

However, there are some examples and trends to note regarding threats to water resources from pollution (both point and non-point source pollution).

There has been a substantial reduction in point source discharges of toxic substances into Canadian waters over the last 15 years. For example, by 2003, under the St. Lawrence Action Plan, toxicity of effluent discharged into the river by 50 of the most polluting industrial plants had been reduced by 96 percent; 80 plants attained their toxic effluent reduction objective; and 11 persistent bioaccumulative toxic substances were virtually eliminated.

The greatest success may be the reduction of dioxins and furans from pulp and paper mills practising chlorine bleaching. This was accomplished through federal government regulation under the Canadian Environmental Protection Act and through industry innovation to create a system of pollution prevention and receiving water monitoring. Pollution prevention focuses on the use of processes, practices, materials, products or energy that avoids or minimize the creation of pollutants and waste, and reduce the overall risk to human health or the environment.

However, other key sources of pollution remain. In 1999, 97 percent of the municipal population received some form of sewage treatment, and 78 percent received secondary or tertiary treatment. And while we have increased the number of communities with primary treatment (from about 1 in 30 in 1989, to 1 in 8 in 1999), about one trillion liters of primary or untreated sewage pours into our water every year. In 1999, about 82,750 tones of total nitrogen and 4,950 tones of total phosphorus were released to lakes, rivers, and coastal waters from municipal sewage.

Waste management from agriculture, mining, industry, and municipalities also presents possible threats to water quality. Leachate from landfills can commence years after a landfill has been decommissioned and can contain a wide variety of chemical compounds. Waste management from other sources of waste, including biosolids or municipal sludge, mine tailings, and agricultural waste, may also pose threats to water quality and ecosystem health. The production of agricultural animal waste is becoming more concentrated as animal husbandry evolves into larger operations, requiring appropriate management protocols to minimize risk. There is also a growing concern about the possible presence of pathogens and pharmaceuticals in the animal waste. While the number of mines has remained relatively constant in Canada over recent years, operation size is increasing resulting in a greater volume of wastewater. Biosolids, the sludge left over following municipal waste-water treatment, is often spread on agricultural land as fertilizer. Unfortunately, assessment of risks associated with these possible sources of water pollution is difficult do to a lack of data.

With respect to nonpoint sources of pollution, a tremendous challenge remains in the need to understand and address the cumulative impacts of multiple point and nonpoint source impacts on ambient water quality and quantity, including agricultural and municipal runoff.

In the Canadian Great Lakes region, urban runoff discharges are annually in the order of  $10^5$  tones of suspended solids,  $10^4$  tones of chloride,  $10^3$  tones of oil and grease, and  $10^2$  to  $10^3$  tones of trace metals.

Agricultural runoff contains large amounts of nutrients (nitrogen and phosphorus). National estimates of the quantity of nitrogen and phosphorus lost to surface and ground waters from agricultural lands are not available for Canada. But as an example of the magnitude of the issue, agricultural sources are estimated to contribute 70 percent of the nitrogen and 75 percent of the phosphorus load discharged from the Yamaska River in Quebec to the St. Lawrence River. It may also contain pesticides, as 80 percent of pesticide use in Canada is for agricultural purposes. However, we lack good data on the presence or absence of pesticides in Canada's waters.

Contamination of aquatic ecosystems by long-range transport of airborne pollutants, such as sulfur dioxide and nitrogen oxide causing acid rain, is a concern in Canada. Just over 45 percent of Canada's total surface area is highly sensitive to acid rain. Much of this area is in eastern Canada where the Canadian Shield has little ability to neutralize acidic pollutants.

Also impacting Canada's water quality is a significant historical legacy of persistent organic pollutants that have been captured in soils, and sediments and other reserves in the environment. As controls are being instituted for these chemicals, releases have dropped in recent years. However, there is the potential for significant remobilization. Furthermore, mercury, a key persistent contaminant, has many natural sources as well as a long history of industrial use. Over 95 percent of fish consumption advisories in the Great Lakes are due to mercury. (The rest are due to PCBs and toxaphene.)

All of these diverse nonpoint sources combine with point sources to produce cumulative impacts that are integrated on the scale of watersheds. As noted in the section on decision-making, some jurisdictions have begun to take comprehensive watershed-based approaches to addressing these issues.

## B) Protection of Water Resources

*For information about water management, please see sections on Decision-Making and Integrated Water Resources Development and Management.*

To monitor water quality and assess pollution threats, Environment Canada and its counterparts in provincial and territorial governments have a successful 27-year collaborative agreement on water resource monitoring and data/information within Canada, which focused on water quantity monitoring. All jurisdictions conduct monitoring programs to assess water quality and to measure impacts of point and nonpoint sources of pollution. Many of these programs are designed to meet the specific priorities and circumstances of individual jurisdictions. Provinces, territories, and the federal government are collaborating on developing a data referencing system under the auspices of the CCME. This will facilitate linking water quality monitoring networks across the country to provide more complete information on water quality and trends.

In addition, Health Canada along with provincial and territorial health departments and public health organizations collect and synthesize data on waterborne disease under the National Enteric Surveillance Program. These data are used in outbreak identification and response and are useful in identifying trends and communities or regions at risk.

Efforts to augment freshwater supplies are limited to urban areas experiencing high population growth and to drier regions of the country. The hydrological studies of the Geological Survey of Canada help to increase knowledge of aquifers and in some cases can determine the rates of the groundwater recharge essential to sustainable groundwater management. Some provincial governments, such as Saskatchewan, have programs aimed at procuring and augmenting freshwater supplies.

Parks Canada leads the *Canadian Heritage Rivers System*, Canada's national program for freshwater heritage conservation. It is a cooperative federal-provincial-territorial program whose objectives are to give national recognition and protection to Canada's outstanding rivers. There are currently 39 rivers in the System. Parks Canada establishes and manages National Marine Conservation Areas (NMCAs) to represent Canada's 29 marine natural regions, five of which are in the Great Lakes.

### C) Drinking Water Supply and Sanitation

*For aspects related to sanitation, refer to the Country Profile on Sanitation.*

In Canada, provinces and territories are generally responsible for the delivery of drinking water and wastewater services, while the federal government has specific responsibilities related to First Nations and to federal lands. In the case of wastewater effluents, the Federal Government also has obligations under the *Canadian Environmental Protection Act* and the *Fisheries Act*.

To improve the efficiency of water and wastewater services in First Nations communities in Canada, a seven-part water management strategy is going to be implemented over the next five years. The strategy provides for the coherent and structured management of water quality on reserves using a multi-barrier (source to tap) approach. This includes protecting source water from pollution such as wastewater effluents, as well as providing effective drinking water treatment and distribution of drinking water. The implementation of the strategy will require close collaboration among federal and provincial partners and First Nations. Once implemented, it will improve the efficiency of delivery of drinking water and wastewater services in First Nations communities of Canada. The strategy provides for joint indigenous-government initiatives to increase monitoring of water treatment systems, to train water treatment operators and to evaluate and advise indigenous communities on the design and operation of water treatment systems.

In addition, the federal government is presently working on developing clear, consistent guidance to ensure the safety of drinking water on federal lands (including First Nations lands) and/or in federal facilities through a document entitled "Guidance for providing safe drinking water in areas of federal jurisdiction". This document is based on the "Guidance For Safe Drinking Water In Canada: From Source To Tap" developed by environment and health departments at the federal and provincial/territorial levels.

The Government of Canada advocates full-cost accounting and user/polluter pay principles for water and wastewater services. In any water and wastewater initiatives, such as infrastructure

funding programs, the federal government will continue to encourage all jurisdictions to implement water metering and realistic water pricing.

Under the *Canadian Environmental Protection Act* the federal Government proposed on June 7, 2003 to use pollution prevention planning as a first step in a comprehensive approach to managing wastewater effluents. On November 25 2003, the Canadian Council of Ministers of the Environment (CCME) decided to develop over the next three years, a Canada-wide Strategy for municipal wastewater effluents.

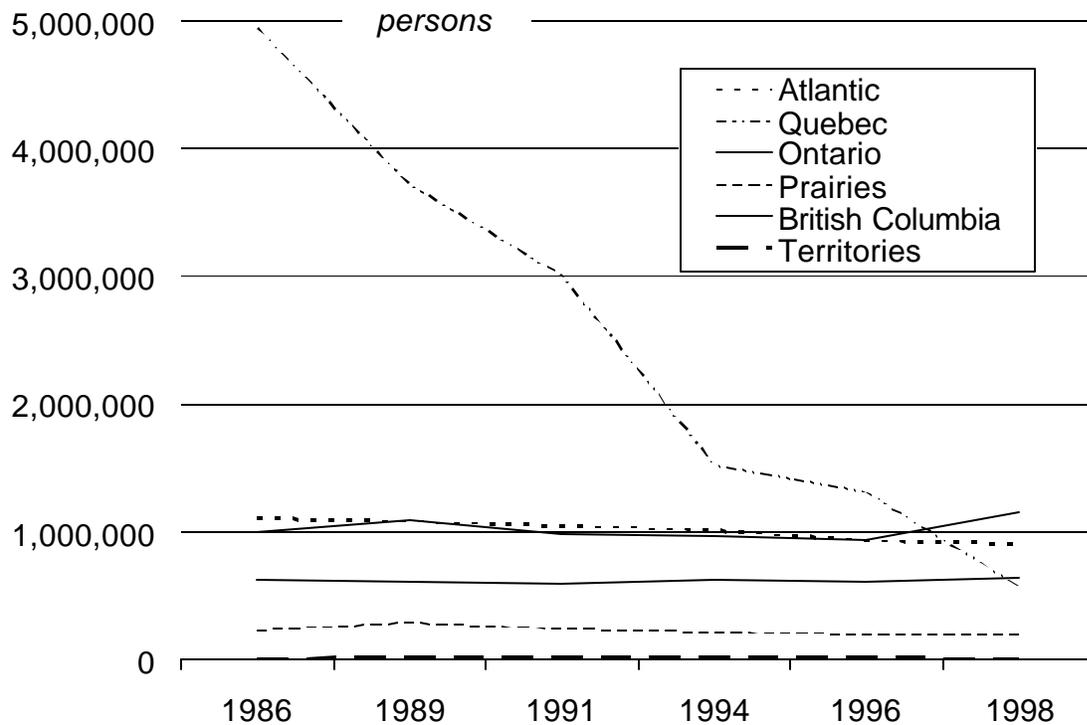
Statistically, although there have been absolute increases, the connection rate of the population to centralized systems in Canada, including both sewers and water lines, has remained relatively stable as a proportion of the overall Canadian population over the past twenty years. From 1983 – 1999, the proportion of the population connected to sewers only rose from 71.8% to 74.3%, while the percentage of Canadians connected to centralized water systems grew marginally from 75.4% to 77.6%. This stability in connection rates is a reflection of the stable urbanization rate in Canada over this period, in which the proportion of the population that is urban rose only slightly from 75.5% in 1976 to 77.9% in 1996.

Year	Population Served by Sewers (in millions)	Population Served by Water (in millions)	Total Canadian Population (in millions)	% Population Served by Sewers	% Population Served by Water
1983	18.2	19.1	25.4	71.8	75.4
1986	18.7	19.9	26.1	71.6	76.2
1989	19.5	21.1	27.3	71.5	77.4
1991	20.5	21.8	28.0	73.1	77.6
1994	21.2	22.2	29.0	72.8	76.5
1996	22.0	23.1	29.7	74.1	77.9
1999	22.7	23.7	30.5	74.3	77.6
Year	Urban Population (in millions)	Rural Population (in millions)	Total Canadian Population (in millions)	% Urban	% Rural
1976	17.4	5.6	23.0	75.5	24.5
1986	19.4	6.0	25.3	76.5	23.5
1996	22.5	6.4	28.8	77.9	22.1

Notes: Water and wastewater data comes from the Municipal Water Use Database (MUD) Survey. Total Canadian Population (upper figures) from Statistics Canada (Human Activity and the Environment Annual Statistics 2002). Population statistics come from Statistics Canada Censuses (Human Activity and the Environment 2000).

For the Canadian population connected to sewers, there has been a major increase in the proportion receiving some level of wastewater treatment, which has risen from 72% of the population connected to sewers in 1983 to 97% by 1999. Or, as the graph below illustrates, the proportion of the population connected to sewers in Canada and not receiving wastewater treatment has declined from 28% in 1983 to a mere 3% in 1999.

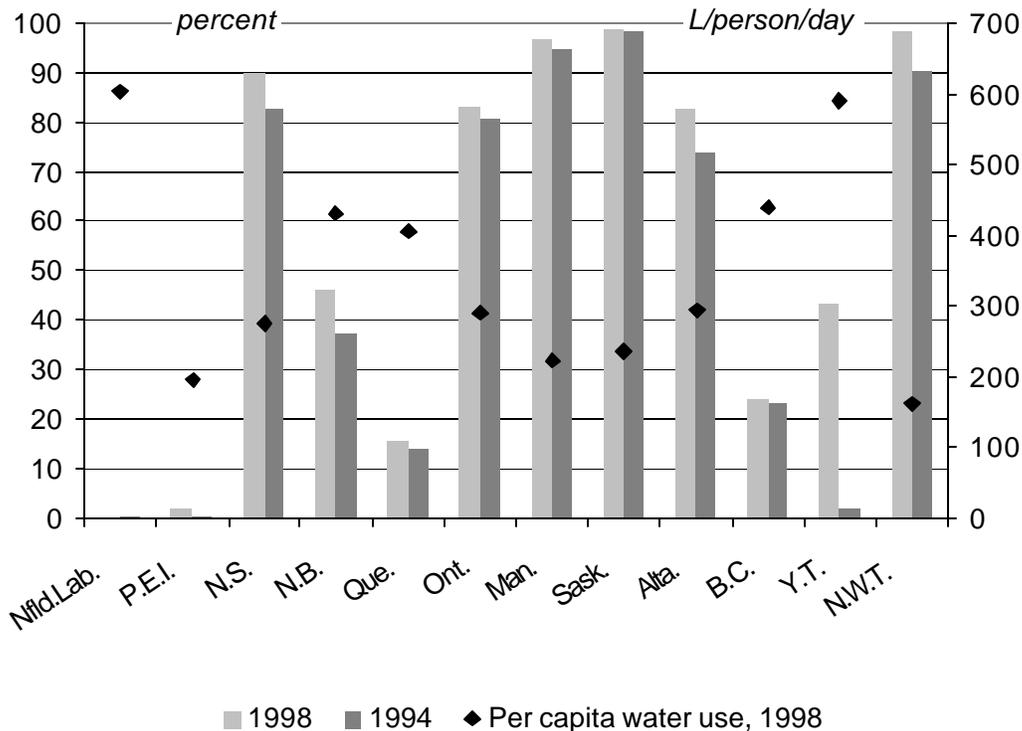
**Population on sewers but not connected to a wastewater treatment plant, by region, various years, in municipalities >1000 (MUD database)**



In 1994, the National Action Plan to encourage municipal water use efficiency was created. This plan was introduced by the CCME in collaboration with municipal governments. Part of the plan included the implementation of mandatory water metering. Since the introduction of the plan, every province and territory in the country has increased the number of its residents connected to water meters (see the accompanying Figure). The Yukon Territory has increased metering the most, particularly in Whitehorse, where metering increased from 1% to over 40% between 1994 and 1998.

Overall, however, only 56% of Canada's municipal population had water meters in 1999, up from 52% in 1991, a very gradual increase. Canadians served with meters tend to use less water than those charged a flat rate. In 1999, households paying for water by volume (i.e. metered) used about 269 litres per person per day, whereas households paying a flat rate for water used 457 litres per person per day, 70% more than metered households. Canadians who have meters and pay for water by volume are faced now with water use charges that encourage more water conservation.

## Population with Metering and per Capita Water Use, 1994 and 1998



Source: Environment Canada, Municipal Water Use Database.

### D) Water and Sustainable Urban Development

*For aspects related to human settlements, refer to the Country Profile on Human Settlements.*

As mentioned, the 1994 CCME National Action Plan for Municipal Water Use Efficiency has resulted in the implementation of new government programs and policies that contribute to water efficiency. For example, Ontario and British Columbia have introduced plumbing codes that promote water efficiency. Measures such as municipal source control programs minimize the entry of pollutants such as metals into sewer systems. In addition, the Federation of Canadian Municipalities promotes the development of sustainable green municipal infrastructure through its best practices guide for green technologies. However, as of 1999, 43% of Canadian municipal households are not metered and therefore pay a flat rate for their water. Canadian municipal water prices currently cover roughly half the costs of supplying water and treating municipal wastewater. Basically, pricing of water has been used at municipal level but the charge is not, on average, set at an appropriate level to ensure an efficient water consumption level.

More recently, CCME Ministers, at their November 2003 meeting, issued a communiqué which outlined their interest in work on water: “*Building on their 2001 commitment to clean, safe and*

*secure water for all Canadians, ministers reaffirmed water issues as a priority, and agreed to explore conservation measures, including economic considerations, public education and the need for better information.”* A CCME Water Scoping Committee had identified two related categories of work that could be pursued by CCME: water conservation and economic instruments.

The Government of Canada is also developing a policy to promote full-cost accounting and full-cost pricing of water services and has promoted this, in part, through eligibility criteria under the Infrastructure Canada and the Green Municipal Funds. In any water and wastewater initiatives the federal government will continue to encourage all jurisdictions to implement water metering and realistic water pricing while recognizing that this responsibility resides with municipal governments. These funds will encourage cost-effective demand-side management policies and programs as well as the use of full-cost accounting and full-cost pricing.

#### E) Water for Sustainable Food Production and Rural Development

Water used in food production can act as a vector for waterborne pathogens. Pathogens of concern include bacterial pathogens (salmonella, shigella, campylobacter, and various pathogenic strains of E. coli), viral pathogens (Norwalk virus, hepatitis virus, and other human enteric viruses), and protozoan parasites (entamoeba histolytica, giardia lamblia, cryptosporidium parvum and cyclospora). Chemical contaminants that could result from environmental contamination or from a chemical spill, incorrect use of pesticides or cross contamination of the water supply with sewage or industrial waste may also render water unsuitable for use in food processing.

The presence of fertilizers in water leads to periodic algal blooms in many parts of Canada. These can have severe effects on the aesthetic quality of the water (taste, odour), and can compromise public confidence in water systems. Some algal blooms produce toxins that can affect human health.

Currently, pathogens are the most prominent contaminants in well water, with 20 to 40 percent of surveyed rural wells having coliform counts in excess of drinking water guidelines. In addition, in most provinces 5 to 20 percent of wells are contaminated with unsafe levels of nitrate with up to 60 percent of wells contaminated in regions with high-demand crops or intensive livestock operations.

In 1996, agriculture used about 9 percent of all water withdrawn in Canada and consumed over 74 percent of that amount, making it the single largest sectoral consumer of water. Since 1981, water withdrawn for agricultural purposes has been steadily increasing with most being used for irrigation and 5 percent being used for livestock purposes. The three most western provinces (British Columbia, Alberta, Saskatchewan) are the most intense agricultural water-users, withdrawing over 90 percent of the total water volume used on farms in Canada in 1996.

A combination of measures has been implemented to lessen the impact of agriculture on water quality. Environmental aspects feature prominently in the recent Agricultural Policy Framework (APF) jointly promoted by federal, provincial and territorial governments. The APF provides for

setting water-related performance measurement indicators and targets, and allocates funding for “environmental scans” to be carried out on all Canadian farms. Use of nitrogenous fertilizers and pesticides remains low by OECD standards, and the impact of agricultural activities on surface water or groundwater (e.g., feedlot runoff, or pesticide leaching) is regional rather than ubiquitous.

*The National Water Supply Expansion Program (NWSEP)* is a four year \$60 million initiative to improve producer capacity to deal with drought through expanded water supply and protection of the resource. Through the NWSEP, Agriculture and Agri-Food Canada provides financial assistance for the development of solutions to water supply issues across Canada that are considered a priority for agriculture. These may include infrastructure development such as surface storage projects, wells, regional water pipelines, pasture pipelines and tank-loading facilities. Other projects may include strategic studies that will identify water supply solutions for areas that are currently experiencing shortfalls or are anticipated to experience water supply shortages in the near future.

Canada’s *Agri-Environmental Indicators (AEIs)* are measures of key environmental conditions, risks, trends and changes due to agricultural practices. Fourteen indicators have been developed within six categories: environmental farm management, soil quality, water quality, greenhouse gas emissions, agro-ecosystem biodiversity, and production intensity. The indicators are expected to benefit both Canada's agricultural industry and the environment by generating information on the agricultural sector’s environmental performance; demonstrating the agricultural sector's progress in adopting stewardship principles and environmentally sound practices; supporting the development of strategies that target areas and resources facing environmental risks; and facilitating environmental analysis and monitoring of agricultural policies and programs.

#### F) Impacts of Climate Change on Water Resources

All levels of governments are taking seriously the impacts of climate change on water resources. Canada’s Climate Change Action Fund supports research in many parts of Canada to identify potential impacts of climate change on local or regional environments and to indicate possible strategies for adaptation and mitigation.

In northern and western Canada, researchers are determining climate impacts on extreme events such as floods and low flows, particularly as they affect transboundary waters; analyzing the role of climate over the last 20 years in catastrophic lake drainage and changes in permafrost; studying changes in the snow and ice resources of the Western Cordillera in relation to hydro-electric power production; investigating boreal wetlands as sources or sinks of carbon and the impact of predicted climate changes on carbon stocks within these systems; analyzing climatic trends in major hydrologic fluxes, and clarifying hydro-ecological impacts on northern lakes, rivers and deltas; and evaluating how climate impacts affect aquatic food web structure and dynamics.

On the Prairies, NWRI hydrologists are monitoring water balances in wetlands and generating hydrological models to analyze and predict the impacts of climate change and land use change.

In the Mackenzie Basin, NWRI is investigating circulation, storage and distribution of water and energy and using results to improve models to predict changes in Canada's North.

In the Arctic, NWRI is leading the assessment of climate change on Arctic freshwater ecosystems and hydrology as a contribution to the Arctic Climate Impact Assessment (ACIA) for the Arctic Council, and assessing impacts of climate variability on Arctic river flow and inputs to the Arctic Ocean.

In the Great Lakes basin, groundwater experts are modeling groundwater and climate interaction, and assessing the combined impacts of climate variability, climate change, and water use on groundwater dependent water supplies, in-stream conditions, and aquatic habitat; NWRI hydrologists and modelers are conducting studies on the impacts of climate warming on Great Lakes hydrodynamics and water quality.

Successful adaptation (with respect to extreme hydroclimatic events or any other field) requires identification of key vulnerabilities, and measures to enhance adaptive capacity. Many of these measures have benefits beyond climate change, such as building ecological resilience. Adaptation that helps address current vulnerabilities can proceed in the absence of any definitive "predictions" of changes in future extremes.

In order to reduce Canada's vulnerability to climate change, a number of Government of Canada initiatives have been undertaken or are in development to address the issue of climate variability and adaptation. These include the development of a national disaster mitigation strategy, led by the Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP); research and development studies by the National Water Research Institute (NWRI) and other federal organizations some of which are supported by the Government of Canada Climate Change Action Fund (CCAF); the continued support of the hydrometric monitoring network that the Water Survey of Canada (MSC) maintains; the development of an Environment Canada Water Strategy possibly leading to a Federal National Water Strategy; a pan-Canada governmental policy initiative to pursue an integrated water resource management (IWRM) approach with a watershed focus; and, ratification of the Kyoto Protocol. Natural Resources Canada is also interested in examining building codes with consideration to the potential impacts of climate change.

In Canada, flood disaster preparedness is coordinated mainly by the provincial emergency measures organizations and community officials. The federal and provincial governments, in coordination with Prairie Farm Rehabilitation Administration, develop policies for mitigating the effects of droughts. There are also crop insurance programs to assist farmers in the event of major crop losses, as well as drought indexes and forecasting for information and planning purposes during extremely dry periods. In the case of municipalities, most have conservation measures ready to be implemented should water supplies become low. For agricultural use the federal government of Canada currently operates and maintains six irrigation projects serving 18 000 hectares of land in southeastern Saskatchewan.

There is a need to factor in long-term climate predictions into water management decisions. The changes in availability and distribution of surface and groundwater, and the predicted increase in frequency of severe weather events (e.g., floods, droughts), require changes to governance, including the application of Integrated Water Resource Management and watershed approaches, and adoption of strategies to mitigate and to adapt to potential climate change impacts.

## **Water Strategies**

### **A) Capacity-Building, Education, Training and Awareness-Raising**

Canada's provincial governments are actively promoting various water conservation programs aimed at raising public awareness of conservation and pollution prevention issues. In 1999, British Columbia developed a province-wide water conservation strategy. Under a *Canada-Newfoundland Agreement Respecting Water Resource Management*, the province prepared several brochures and guidelines to increase public awareness.

The Federal Water Policy commits the federal government to the concept of “a fair value for water” and the thus the promotion of realistic water pricing. Through its work with the CCME Advisory Group on Water Efficiency and its successor, led by the Canadian Water & Wastewater Association (CWWA), Environment Canada (EC) has been promoting water efficiency across the country. By establishing and chairing the Interdepartmental Advisory Group on Water Conservation at Federal Facilities, EC is promoting water efficiency within the federal government. The Code of Environmental Stewardship, the Greening Government initiative and departmental Sustainable Development Strategies are all promoting water efficiency.

EC, in partnership with the CWWA, has also developed an Internet-based water efficiency experiences database which is searchable and includes details of water efficiency activities from all sectors including governments, municipalities and the private sector. The department also produces a wealth of water awareness resources and tools including fact sheets, an Internet site, speaker’s kit and a display to assist in promoting water efficiency messages in communities. For more information on water use in Canada visit our internet site on the Green Lane: [http://www.ec.gc.ca/water/en/manage/use/e\\_use.htm](http://www.ec.gc.ca/water/en/manage/use/e_use.htm).

### **B) Information**

The Government of Canada is currently implementing several key initiatives that will improve knowledge and information about water. Provincial and territorial governments are also pursuing several activities.

Statistics Canada is in the process of creating an expanded set of national accounts to serve as the basis for sustainable development analysis. This system will incorporate improved data on natural, human and social capital, including for water.

*The National Land and Water Information Service (NLWIS)* is a tool for better management of land and water resources by encouraging responsible environmental choices by those who make the day-to-day decisions on land and water management. This service provides online access to information on soils, landscape, hydrology, land use and other data required by producers,

agricultural industry groups, municipalities and governments to manage Canada's land and water resources.

In addition to the NLWIS, the Canadian Information System for the Environment (CISE - led by Environment Canada) and GeoConnections (led by Natural Resources Canada) are undertaking the development of CISE Water, a comprehensive national water information portal. The portal, to be developed by 2005, will improve public access to national water information, mapping capacity, and decision-support and interpretation tools.

The federal government also surveys water and wastewater treatment in each Canadian municipality with a population greater than 1000. The survey covers pricing, pricing structure, water use and level of wastewater treatment and is undertaken approximately every three years. A special supplement was added to the 2003 survey to gather information on water and wastewater infrastructure in Canada. The combined information will allow for improved analysis of microeconomic conditions, including expenditure, prices and financing of water and wastewater management.

Federal, provincial and territorial governments collaborate on water quantity monitoring (Hydrometric Agreements). They regularly collect information on Canada's water resources, including information on levels, flows, and quality, in order to meet demand, protect health and well-being, and provide a basis for sound economic development. Information is also collected on key Canadian aquifers and their groundwater resources.

CCME is developing consistent procedures for Canadian jurisdictions to publicly report water quality information using a water quality index (WQI). In May 2003, the National Round Table on the Environment and the Economy (NRTEE) proposed a National Freshwater Quality Indicator, based on the CCME Water Quality Index, as one of six recommended Environment and Sustainable Development Indicators (ESDI). The federal government is working towards having the WQI accepted nationally, as it is already being used by many provinces.

Canadian environmental water quality guidelines are developed in cooperation with the provinces and promulgated as national guidelines by the Canadian Council of Ministers of the Environment. The guidelines help to protect and enhance major uses of water, including freshwater and marine life, agricultural uses (livestock and irrigation waters) and recreation. The provinces and territories use these guidelines to establish their own guidelines, objectives and regulations. In 1999, the CCME released a comprehensive set of over 550 environmental quality guidelines for water, air, soil, sediment and tissue residue that promote an integrated approach to protecting and sustaining water quality within an ecosystem context. This is the world's largest integrated compendium of ambient environmental quality standards. This publication includes guidelines produced by other federal departments and their partners, such as guidelines for drinking water quality and for recreational water quality.

The federal and provincial governments, as well as other authorities, regularly collect information on Canada's water resources, including information on levels, flows, and quality, in order to meet demand, protect health and well-being, and provide a basis for sound economic development. Information is also collected on key Canadian aquifers and their groundwater

resources. In addition, there are direct monitoring programs, such as the Shellfish Water Quality Protection Program, which is one of Environment Canada's largest water quality monitoring programs in terms of geographic coverage. Based on this monitoring, more than 11,500 km<sup>2</sup> is approved for direct harvesting of shellfish.

Water management in Canada is continuously improved through the development of new Water Quality Guidelines, Site-Specific Water Quality Objectives, and Water Quality Management Frameworks for priority issues such as nutrients and source water protection, and through the consistent application of these tools in combination with environmental monitoring, reporting and information systems.

Information is also available through various government web sites (and the CCME website) linked with numerous organizations and agencies such as the Canadian Water and Wastewater Association, the Canadian Water Resources Association, the Canada Mortgage and Housing Corporation, and many provincial and municipal agencies. Information on water use is also distributed to the public through summary reports, and in various professional papers. Information on freshwater resources management and development is also available at: [www.ec.gc.ca](http://www.ec.gc.ca)

### **C) Research and Technologies**

Canada has developed water-related scientific expertise, which it applies to domestic and international water priorities. The Government of Canada has water-related expertise in all its science-focused departments (Environment, Fisheries and Oceans, Natural Resources, Health and Agriculture and Agri-Food). Agencies and institutions such as the Canadian International Development Agency and the International Development Research Centre play key roles in supporting and disseminating research that is relevant to water management internationally.

Within those departments and agencies, a number of groups play particularly prominent roles in water-related research that benefit all jurisdictions in Canada and many partners internationally. For example, the National Water Research Institute (NWRI) is the largest freshwater research establishment in Canada, with facilities at Burlington, Ontario (Canada Centre for Inland Waters) and Saskatoon, Saskatchewan (National Hydrology Research Centre). NWRI conducts a comprehensive program of research and development in the aquatic sciences in partnership with the Canadian and international science communities. The St. Lawrence Centre in Montreal is devoted entirely to river ecosystems. It undertakes research programs to improve the understanding and dissemination of knowledge of St. Lawrence ecosystems. The Department of Fisheries and Oceans operates nine science institutes across the country related to integrated resource management, ocean management, fisheries management, habitat protection and species at risk and climate, hydrography.

The Meteorological Service of Canada (MSC) supports research into weather-related issues and hydrology. It is also responsible for the Water Survey of Canada, which tracks and assesses water quality and quantity data in collaboration with provincial and territorial governments. Information supports a range of modeling initiatives that can be used to protect human health, safety, and ecosystems and assess resource utilization.

The Geological Survey of Canada supports research and analysis of hydrological issues, including groundwater, and provides expertise concerning the potential impacts of issues such as climate change that benefit both Canada as well as the international community.

Canada's Climate Change Action Fund is supporting research in many parts of Canada to identify potential impacts of climate change on local or regional environments and to indicate possible strategies for adaptation and mitigation.

The Environmental Technology Centre has a strong technology transfer element related to environmental protection under their mandate. Through collaborative arrangements with the private, public and academic sectors, research is undertaken and technology is shared with similar researchers throughout the world.

Canada plays a significant international role in drinking water quality, through long term international partnerships on drinking water issues, with groups like the World Health Organization (WHO) and the U.S. EPA. Health Canada's Water Quality Program has recently been named a Pan-American Health Organization/WHO Center for water quality, and contributes to guideline development, laboratory and field, investigations for chemicals, and health and safety studies of materials.

The National Water Research Institute is the Canadian government's main scientific research centre on water, such as the newly released science assessment of the threats to water quantity which complements a similar assessment completed in 2001 on the threats to water quality.

Canada also promotes capacity building and technology transfer to developing countries through a variety of institutional arrangements, including the Canadian International Development Agency (CIDA), the NWRI and through the Meteorological Services of Canada. Through CIDA, Canada supports developing country efforts to address their water and sanitation challenges through an approach founded on capacity development and integrated water resource management. Policies and programming range from the local to the international level. Canada also has strong partnerships with international organizations that emphasize capacity building, such as the Global Environmental Monitoring Systems Water Program, based in NWRI in Burlington, Ontario, and the United Nations University International Network on Water, Environment and Health headquartered at McMaster University in Hamilton, Ontario.

#### **D) Financing**

*For aspects related to cooperation or assistance to other countries, please refer to the section on Cooperation.*

The federal government announced \$600 million in new infrastructure funding, targeted towards improving the quality of water and wastewater treatment in First Nations communities through a seven-part First Nations Water Management Strategy to improve the quality of water on reserve. The seven-part strategy will be implemented over the next five years, and provides for the coherent and structured management of water quality on reserves consistent with the multi-barrier (source to tap) approach developed by CCME.

As well, Canada invests directly in water and wastewater through its various infrastructure programs. These include \$485 million of federal funding through the Infrastructure Canada Program, \$94 million (to date) in projects announced under the Canada Strategic Infrastructure Fund, as well as additional funding through the Green Municipal Funds.

## **E) Cooperation**

*For aspects related to funding from domestic sources, please refer to the section on Financing.*

The purpose of Canada's ODA is to support sustainable development in developing countries in order to reduce poverty and to contribute to a more secure, equitable and prosperous world. CIDA's *Sustainable Development Strategy 2001-2003: Enabling Change* was released to the Canadian Parliament on 16 February 2004. The Sustainable Development Strategy sets out a number of key directions for the Agency for the next three years, which will be refined under CIDA's transformation exercise as part of the Government of Canada's current International Policy Review. These directions include the following:

- Greater alignment of aid with the plans and priorities of partner countries;
- Sharpened focus on poverty reduction (including greater concentration of resources on the poorest countries);
- Improved coherence between aid and non-aid policies;
- Greater emphasis on security and development;
- Strengthened effectiveness of institutional partners; and
- Renewed efforts to engage Canadians.

The new Strategy brings together and builds upon many of the changes that CIDA has made since the *Sustainable Development Strategy 2001-2003: An Agenda for Change*. In particular, it will facilitate the implementation of the 2002 *Canada Making a Difference in the World: A Policy Statement on Strengthening Aid Effectiveness*, which outlines CIDA's commitments to implement the internationally agreed-upon principles of aid effectiveness through new programming approaches and better focus of effort.

The Strategy is based on the four interconnected dimensions of sustainable development for CIDA: economic well-being, social development, environmental sustainability, and good governance. These dimensions are reflected in the Key Agency Results (KARs), which are in turn linked to the global Millennium Development Goals. The KARs have been refined and updated in the Strategy and now include outcomes, targets, and indicators.

Canada's International Assistance Envelope provides Official Development Assistance (ODA), delivered through a broad range of programs and policies. Most ODA is directed at low-income countries through CIDA. CIDA's bilateral development assistance programming is complemented by support for relevant international financial institutions and other multilateral organizations, particularly those in the UN system.

ODA has been identified as the main source of external funding to assist developing countries in the implementation of *Agenda 21*. Canada remains committed to the long-term goal of setting ODA at 0.7 per cent of gross national product as the fiscal situation permits. In 2002, Canada committed to increase its development assistance by eight per cent annually, resulting in doubling by the end of the decade, with 50% of new resources to be directed to Africa.

Canada contributes, through the Global Environment Facility and other multilateral institutions, to international funding for capacity-building, technology transfer and adaptation activities in the areas of climate change, biodiversity, international waters, ozone depletion, persistent organic pollutants, and land degradation. Canada also established at the World Bank the C\$20 million Canada Persistent Organic Pollutant (POPS) Fund to help build the capacity of developing countries to manage persistent organic pollutants. Canada also contributes to other multilateral organizations that work on water including the World Health Organization, UNICEF, UNEP, etc.

From 1986/87 to 2001/02, CIDA's total disbursements on water-related programming totaled \$600 million, or 2.5% of CIDA budgets for the same period. The main focus of CIDA's support to water-related programming has been on strengthening institutions and building capacity of local and national institutions to deliver adequate water-related services.

Through the Canada Fund for Africa, Canada has committed \$50 million to water-related investments, including: \$15 million to UN Habitat's Water and Sanitation Trust Fund; \$10 million to the Global Water Partnership to fund the development of IWRM plans in selected African countries; \$20 million to support the African Water Facility; and \$5 million to the African Development Bank to strengthen capacity in water-related activities.

In 1996, the United Nations University, with the Government of Canada, established the International Network on Water, Environment and Health (INWEH) with its headquarters at McMaster University in Hamilton, Ontario. INWEH is a problem-solving network of universities, colleges, research institutes, governments, non-government agencies, and the private sector that addresses critical water and health issues in developing countries by providing training and education to enable such countries to practice sustainable development.

The UNEP Global Environment Monitoring System (GEMS)/Water Programme is a multifaceted water science centre oriented towards building knowledge on inland quality issues worldwide. The twin goals of the programme are to improve water quality monitoring and assessment capacity in participating countries, and to determine the state and trends of regional and global water quality. These goals are implemented through the GEMS/Water data bank, with water quality data from more than 100 countries, and over two million entries for lakes, reservoirs, rivers and groundwater systems. The programme also carries out assessments on a range of water quality issues and methodologies. GEMS/Water is active with many United Nations agencies and other organizations.

Within these initiatives, IWRM-based approaches are key, and source water protection is an integral part of IWRM, and encompasses wetlands and aquatic ecosystems, in addition to lakes and rivers. Canada supports the increased attention to freshwater issues and initiatives to protect biological diversity, domestically (e.g. Ecosystem Initiatives, notably the Great Lakes and St.

Lawrence Action Plans) and internationally (e.g. the Ramsar Convention on Wetlands and the CBD report on Status and Trends of Biodiversity of Inland Water Ecosystems).

*Debt Relief:* Canada has forgiven more than C\$1.3 billion in ODA debt since 1978, including all ODA debts of Heavily Indebted Poor Countries (HIPC), except Myanmar. Canada has also contributed C\$315 million to the HIPC Trust Funds at the International Monetary Fund and the World Bank. Canada has provided ODA on a grant-only basis since 1986 and regularly participates in debt rescheduling exercises through the Paris Club group of creditors. These exercises sometimes include debt forgiveness for countries with debt repayment difficulties, including middle -income countries. Through this mechanism, Canada has provided more than \$2 billion in debt forgiveness on commercial sovereign loans.

*Trade with developing countries:* The most visible element of Canada's hemispheric commitment to sustainable development is the Free Trade Area of the Americas (FTAA). Created out of the Summit of the Americas process, the FTAA complements the Summit objectives of strengthening democracy, promoting human rights and reducing inequalities and poverty. The FTAA will help countries in the Americas achieve these objectives. Canada is engaged in other regional and bilateral free trade initiatives, including ongoing negotiations with Singapore and with the Central America Four countries (El Salvador, Guatemala, Honduras and Nicaragua). Canada is also involved in exploratory discussions on the possible scope of proposed free trade agreements with the Caribbean Community and Common Market (CARICOM), the Andean Community countries (Bolivia, Colombia, Ecuador, Peru and Venezuela) and the Dominican Republic. Canada seeks to take due account of the development disparities among the parties involved in these initiatives.

\* \* \*

## **Annex 1**

### **Status**

*Population:* The total population in Canada is 32,207,113. The birth rate is 10.99 births/1,000 population; the death rate is 7.65 deaths/1,000 population; the infant mortality rate is 4.88 deaths/1,000 live births; the life expectancy at birth is 79.83 years and the fertility rate is 1.61 children born per woman. In Canada, the age structure of population was influenced in the second half of the 20th century by the baby boom during 1946 to 1966, increased life expectancy, and declining birth rates that have remained below the replacement level since 1972. As a consequence, Canada's population, like that of other industrialized nations, is aging. This demographic reality presents new challenges for Canadian society. In light of the evolving make-up and age structure of Canadian society, demographic considerations are critical to ensuring that government policies and programs remain responsive to the changing needs and circumstances of the population. Within Canada, immigration now accounts for about 60 per cent of the country's total population growth. In the present context of low fertility and possible negative natural increase by 2024, immigration becomes the major factor in Canada's population growth. The settlement patterns of immigrants and refugees mean that the impact of population growth in Canada is highly concentrated in the largest urban centers. The number and proportion of the elderly population have been increasing, as people live longer and healthier lives. The population 65 years and over was 12.6 per cent in 2000. By 2050, this segment of the population will account for about 25 per cent of the total Canadian population.

Canada's primary objectives domestically include the promotion of a better understanding of the impact of population dynamics on progress towards sustainable development, and the development of informed policies and strategies aimed at addressing the pressures of population on sustainable development. Canada has set out policies, programs, and legislation at various levels that address population-related issues such as employment, immigration, health, income security and social welfare. These policies reflect demographic considerations, the public's changing needs, and the goals of enhancing full inclusion and participation by vulnerable groups of the population, including youth, seniors, persons with disabilities, recent immigrants, single parents and Aboriginal people.

*Economy:* As an affluent, high-tech industrial society, Canada today closely resembles the US in its market-oriented economic system, patterns of production and high living standards. The 1989 US-Canada Free Trade Agreement (FTA) and the 1994 North American Free Trade Agreement (NAFTA) (which includes Mexico) touched off a dramatic increase in trade and economic integration with the US. The GDP is US\$ 923 billion and GDP per capita is \$US 29,400.

*Poverty:* Canada has made notable progress on reducing the incidence of poverty domestically. By the late 1990s, the percentage of Canadians considered to be low-income had dropped to 11.5 per cent. Although Aboriginal peoples play an increasingly important role in the social and economic development of Canada, the standard of living gap between Aboriginal and non-Aboriginal peoples remains wide. The ongoing resolution of land claims is helping to build political and economic stability in Aboriginal communities.

*Human Settlements:* Canada is one of the most urbanized countries in the world, with 80 per cent of its population living in urban areas. Approximately 23% of Canadians live in coastal areas with populations on the Pacific coast rapidly expanding, and the populations on the East coast expanding at a slower rate. This growth places demands and pressures on the health, quality, productivity and biodiversity of inland and coastal waters. The Canadian standard of living is high, as measured by gross domestic product. The vast majority of Canadians live in comfortable accommodation that contributes to quality of life. Canadian cities face complex, interrelated challenges that are having adverse effects on quality of life and long-term sustainability. These include urban sprawl in turn leading to rising energy consumption, greenhouse gas emissions and the loss of prime agricultural land; pollution to air, water and land; and the related health issues that affect vulnerable populations such as the young, the elderly, and the sick. Canadian communities also face the challenges of access to affordable housing, homelessness, inadequate infrastructure, immigration to urban areas and the downturn of traditional industries and the shift in the skills required for a knowledge-based economy. In order to develop efficient tools and enhance approaches, the Canadian federal, provincial and local governments partner with communities in urban task forces and urban sustainability programs.

*Water Resources:* Canada is the steward of 7 percent of the world's renewable supply of freshwater, has the world's longest coastline, and has 25 percent of global wetlands. Water makes up more than half of the 6400 km border between Canada and the United States border. About 60 per cent of Canada's freshwater drains north toward the Arctic Ocean and Hudson Bay. Approximately 85 per cent of the Canadian population lives in the south, where pollution and escalating demand are increasing pressure on water resources. Canada also has the longest marine coastline of any country, the second largest continental shelf in the world and a total offshore marine area equal to 40% of the Canadian land mass, with complex ecosystems that connect inland freshwater systems to near shore marine waters. However, the sources of water and its distribution and availability vary considerably across the country. Canada's Atlantic and Pacific coastal areas receive an average of between 1100 and 1400 millimeters of precipitation per year. The southern portions of western Canada's prairie provinces receive less than 500 millimeters per year. Those regions experience periodic droughts, while massive floods in other parts of Canada have affected tens of thousands of people.

Despite significant pollution control progress, challenges remain. Many basins are affected by industrial and municipal pollution, urban and agricultural runoff, and airborne pollutants. Degradation is also evident in populated coastal areas, with approximately 3,200 square kilometers of coastline closed to shellfish harvesting as a result of bacterial contamination, often due to inadequate wastewater treatment. Some estuaries and near shore regions, particularly near urban centres and major industrial operations, are degraded by chemical contamination and physical or biological disruption with impacts on other uses of these waters and on the species in those environments. Beaches along Canadian inland and marine coastlines continue to be forced to close due to high bacterial counts in waters.

Approximately 1 000 000 m<sup>3</sup> of wastewater is treated per day. As the result of inquiries into water safety raised by incidents in Ontario and Saskatchewan, most provinces in Canada are revising legislation that governs the supply of potable water. Revisions include more stringent water quality regulations, and more frequent monitoring and reporting. Another development is

the requirement to have all treatment plant operators licensed, and to have periodic evaluations of the potable water supply infrastructure and operations by a qualified professional.

## **Annex 2**

### **Websites**

#### **Federal Websites**

Environment Canada

[http://www.ec.gc.ca/water/e\\_main.html](http://www.ec.gc.ca/water/e_main.html)

National Water Research Institute

<http://www.nwri.ca>

Sustaining the Environment and Resources for Canadians

<http://www.environmentandresources.gc.ca>

Canadian Waters

[http://www.dfo-mpo.gc.ca/canwaters-eauxcan/oceans/index\\_e.asp](http://www.dfo-mpo.gc.ca/canwaters-eauxcan/oceans/index_e.asp)

Health Canada

<http://www.hc-sc.gc.ca/waterquality>

The National Programme of Action for the Protection of the Marine Environment from Land-based Activities

<http://www.npa-pan.ca>

#### **Provincial Websites**

Alberta

<http://www3.gov.ab.ca/env/water/index.cfm>

British Columbia

<http://www.gov.bc.ca/wlap/>

Manitoba

<http://www.gov.mb.ca/conservation/watres/index.html>

New Brunswick

<http://www.gnb.ca/0009/0003-e.asp>

Newfoundland and Labrador

[http://www.gov.nf.ca/env/Env/water\\_resources.asp](http://www.gov.nf.ca/env/Env/water_resources.asp)

Northwest Territories

<http://www.pws.gov.nt.ca/waterandsanitation/index.htm>

Nova Scotia

<http://www.gov.ns.ca/enla/water/>

Nunavut

<http://www.gov.nu.ca/sd.htm>

Ontario

<http://www.ene.gov.on.ca/water.htm>

Prince Edward Island

[http://www.gov.pe.ca/infopei/Government/GovInfo/Environment\\_and\\_Land/](http://www.gov.pe.ca/infopei/Government/GovInfo/Environment_and_Land/)

Quebec

[http://www.menv.gouv.qc.ca/ministere/inter\\_en.htm](http://www.menv.gouv.qc.ca/ministere/inter_en.htm)

Saskatchewan

<http://www.se.gov.sk.ca/environment/protection/water/water.asp>

Yukon

<http://www.environmentyukon.gov.yk.ca/epa/waterqual.shtml>

## **International Websites**

Canadian International Development Agency

<http://www.acdi-cida.gc.ca/index-e.htm>

International Development Research Centre

[http://www.idrc.ca/water/index\\_e.html](http://www.idrc.ca/water/index_e.html)

International Joint Commission

<http://www.ijc.org>

Protection of the Arctic Marine Environment

<http://www.pame.is/>

## **Additional Information**

Canadian Council of Ministers of the Environment

<http://www.ccme.ca>

Government of British Columbia, Water Resource Information

<http://wlapwww.gov.bc.ca/wat/wtrhome.html>

CCME, Source to Tap

<http://www.ccme.ca/sourcetotap/index.html>

Council of Atlantic Premiers

<http://www.cmp.ca/en-main1.html>

Council of Great Lakes Governors

<http://www.cglg.org/index.asp>

Environment Canada, Water Policy and Legislation

[http://www.ec.gc.ca/water/en/policy/e\\_policy.htm](http://www.ec.gc.ca/water/en/policy/e_policy.htm)

Environnement Québec, Quebec Water Policy

<http://www.menv.gouv.qc.ca/eau/politique/index-en.htm>

Fisheries and Oceans Canada, Acts, Orders and Regulations

[http://www.dfo-mpo.gc.ca/communic/policydnload\\_e.htm#Canada%20Shipping%20Act](http://www.dfo-mpo.gc.ca/communic/policydnload_e.htm#Canada%20Shipping%20Act)

Great Lakes Commission

<http://www.glc.org>

Lake Champlain Basin Program

<http://www.lcbp.org>

Mackenzie GEWEX Study (MAGS)

[http://www.usask.ca/geography/MAGS/index\\_e.htm](http://www.usask.ca/geography/MAGS/index_e.htm)

Manitoba Conservation, Water: A Proposed Strategic Plan for Manitoba

[http://www.gov.mb.ca/conservation/watres/water\\_strategy\\_index.html](http://www.gov.mb.ca/conservation/watres/water_strategy_index.html)

Nova Scotia Environment and Labour, Drinking Water Strategy for Nova Scotia

<http://www.gov.ns.ca/enla/rmep/h2ostrat.pdf>

Ontario Ministry of the Environment, Safe Drinking Water Act, 2002

<http://www.ene.gov.on.ca/envision/water/sdwa/index.htm>

Prairie Farm Rehabilitation Administration

<http://www.agr.gc.ca/pfra>

Saskatchewan Environment, Water Management Framework

<http://www.se.gov.sk.ca/ecosystem/water/framework>