

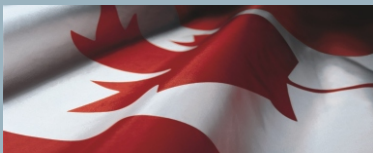


Government
of Canada

Gouvernement
du Canada

WATER AND CANADA:

PRESERVING A LEGACY
FOR PEOPLE
AND THE ENVIRONMENT



Canada 

WATER AND CANADA

Preserving a Legacy
for People
and the Environment

Ottawa, Canada
2003

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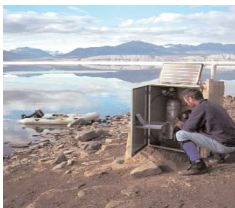
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WATER AND CANADA

PRESERVING A LEGACY FOR PEOPLE AND THE ENVIRONMENT



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 and marine environments. Canadian researchers are helping to strengthen these actions by building the knowledge base to support improved protection and conservation of water and aquatic ecosystems. Sharing this knowledge is vital to understanding and addressing the implications of climate change. 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, integrated management, and improved sanitation.

Water Quantity

Canada has 7 percent of the world's renewable supply of freshwater and 20 percent of the world's total freshwater resources (including waters captured in glaciers and the polar ice cap). 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 percent of the Canadian land mass, with complex ecosystems that connect inland freshwater systems to nearshore 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 millimetres of precipitation per year. The southern portions of western Canada's Prairie provinces, on the other

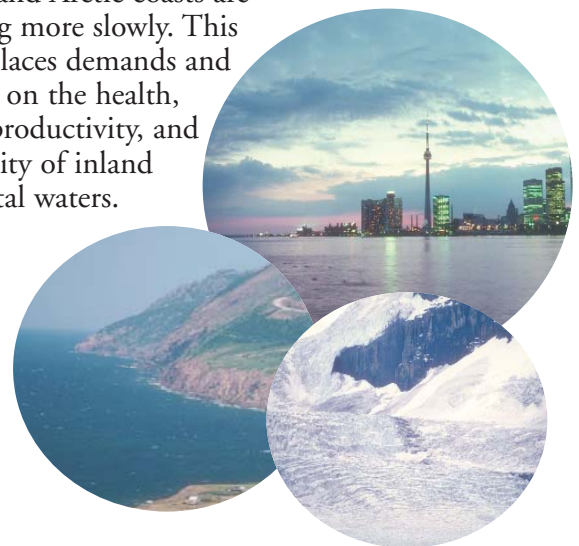
hand, receive less than 500 millimetres per year, and those regions experience periodic droughts. Massive floods in various parts of Canada have affected tens of thousands of people.

Neither is the distribution of water in Canada well matched to the distribution of the population. Almost a third of all Canadians live in the Great Lakes–St. Lawrence River basin in Ontario and Quebec, and almost a quarter live in coastal areas. At the same time, approximately two thirds of Canadian freshwater flows north toward the Arctic Ocean and Hudson Bay.

Water Use and Quality

A variety of issues have helped to draw attention to the need for improved approaches to water resource management in Canada.

Populations along the Great Lakes and the St. Lawrence River and on the Pacific coast are rapidly expanding, while populations on the Atlantic and Arctic coasts are increasing more slowly. This growth places demands and pressures on the health, quality, productivity, and biodiversity of inland and coastal waters.





The majority of Canadians are provided with water for domestic purposes from lakes and rivers, while 26 percent rely on groundwater resources. The quality of the treated water entering Canadian homes is generally very good. However, there have been serious localized outbreaks of waterborne diseases and many cases in which communities have had to boil water to protect against possible threats to health.

Canadians are the second largest consumers of urban domestic water in the world, and there is substantial evidence of inefficient use. This overuse is recognized as a threat to the sustainability of water supplies. The need for water conservation and efficiency is receiving growing attention. More generally, the impacts of water withdrawal and wastewater effluent on aquatic environments are drawing increased attention in Canada.

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 3200 square kilometres of coastline closed to shellfish harvesting as a result of bacterial contamination, often due to inadequate wastewater treatment.

Some estuaries and nearshore 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.

Jurisdiction over Water Issues in Canada

Canada is a federation. As in many areas of Canadian life, this means different levels of government have different jurisdictional roles related to water management, while there are

also many areas of shared commitment. Canadian provinces and territories have the primary jurisdiction over most areas of water management and protection. Most of those governments delegate certain authorities to municipalities, especially the drinking water treatment and distribution and wastewater treatment operations of urban areas. They may also delegate some water resource management functions to local authorities that may be responsible for a particular area or river basin. Most major uses of water in Canada are permitted or licensed under provincial water management authorities.

Federal jurisdiction applies to the conservation and protection of oceans and their resources, fisheries, navigation, and international relations, including responsibilities related to the management of boundary waters shared with the United States. The federal government also has responsibilities for water on federal lands, including Canada's three territories (Northwest Territories, Yukon, and Nunavut), national parks, and First Nations communities.

In practice, all orders of government, communities, the private sector, and individual Canadians have responsibilities and make decisions every day that influence the health and sustainability of freshwater and marine resources. There is a steady and increasing collaboration on water issues.

Canada and International Cooperation on Water Issues in Developing Countries and Economies in Transition

Canada recognizes the importance of water issues to sustainable development in developing countries and economies in transition. More than 1 billion people lack access to safe drinking water, while 2.4 billion lack access to basic sewage systems. It is projected that over the next 25 years, a third of the world's population will face severe water scarcity.



Canada has two major federal organizations that are dedicated to work with partners in developing countries and economies in transition. The Canadian International Development Agency (CIDA) is the lead government organization responsible for Canadian development cooperation. The International Development Research Centre (IDRC) was created “to initiate, encourage, support and conduct research into the problems of the developing regions of the world”. Both have substantial experience in working with international partners to address water issues.

The purpose of Canada’s Official Development Assistance (ODA) is to support sustainable development in developing countries and economies in transition in order to reduce poverty and to contribute to a more secure, equitable, and prosperous world. To achieve this purpose, Canadian ODA concentrates available resources on the following six program priorities, with programs and projects in the water and sanitation sector making critical contributions to all of them: basic human needs; gender equality; infrastructure services; human rights, democracy, good governance; private sector development; and environment.

Canada also recognizes the need for a more comprehensive approach to development cooperation and has integrated key principles for effective development. *Canada Making a Difference: A Policy Statement on Strengthening Aid Effectiveness* outlines key principles that can have profound effects on the developing world:

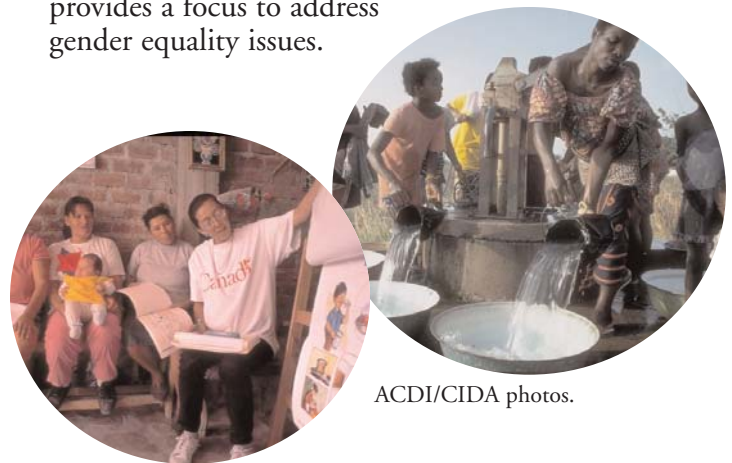
- local ownership
- improved donor coordination
- stronger partnerships
- a results-based approach
- greater coherence in those “non-aid” policies of industrialized countries

In addition to these principles, three other factors are of central importance to Canada’s effective use of aid investments. **Good governance** provides the broad setting for development, and its quality has a profound

effect on development success and aid effectiveness. **Building capacity** — in public and private sectors — is also critical to sustainable development. Finally, participatory processes, particularly those **engaging civil society** and the people expected to benefit, are essential to establishing clear, locally owned priorities for development cooperation. They are also critical to ensuring that aid investments help meet the needs of the poorest and most marginalized people in a society. (For further details, see <http://www.acdi-cida.gc.ca/aideffectiveness>.)

This programmatic approach is closely followed in the water sector. Water supply is a critical human need. The response can impact on poverty reduction, food security, sound environmental development, and gender equality. Water is a necessary input for economic activities such as agriculture, food processing, and manufacturing. Sanitation includes the hygienic removal and disposal of liquid and solid wastes and is important for basic health and for environmental preservation and, consequently, for sustainable development.

Experience around the world for CIDA, IDRC, and other partners in development efforts have demonstrated the importance of local ownership of water management priorities and solutions. This locally centred approach creates opportunities to reduce poverty that reflect real and potential community strengths. It also provides a focus to address gender equality issues.



ACDI/CIDA photos.



GOVERNANCE OF WATER IN CANADA – MODELS OF WATER MANAGEMENT

Overall, provincial governments are responsible for long-term as well as day-to-day management of water resources. Canada’s territorial governments are acquiring more provincial-like responsibilities for water, as well.

Governments in Canada are moving to integrated ecosystem and watershed management approaches that draw on sustainable development principles. These are designed to ensure that decision making balances a range of goals and reflects the interests of many stakeholders including sustainable water and aquatic resource management; protection from water quality-linked health threats; protection of aquatic ecosystems and species; and reduction of the health, economic, and safety impacts from floods and droughts. They are tailored to local situations, such as water allocation considerations in more arid regions.

From a governance standpoint, Canada’s federal, provincial, and territorial governments have developed a number of approaches that may serve as international models for water protection and conservation. These approaches can be broadly categorized under the following headings:

- watershed and ocean strategies and policy instruments
- institutional arrangements and governance (domestically, internationally, and for shared Canada–United States water interests)
- partnerships in action

Given the diversity of issues and approaches, the following sections can point to only a small sample of the many initiatives under these headings.





Water Strategies and Policy Instruments

Provincial Policies/Strategies/Laws

Governments have developed a substantial range of policies, regulations, strategies, and frameworks to enhance the safety of drinking water supplies and to protect and conserve water quality and quantity and aquatic ecosystems. These initiatives include addressing groundwater supplies and surface waters, as well as coastal and marine environments. Generally, jurisdictions are moving toward integrated ecosystem and watershed management approaches that ensure environmental, economic, and social considerations are factored into the decision-making process.

The priorities and specific approaches may vary according to the management needs and specific circumstances of individual jurisdictions. (See examples of recent strategies and policy instruments in box on page 6.)

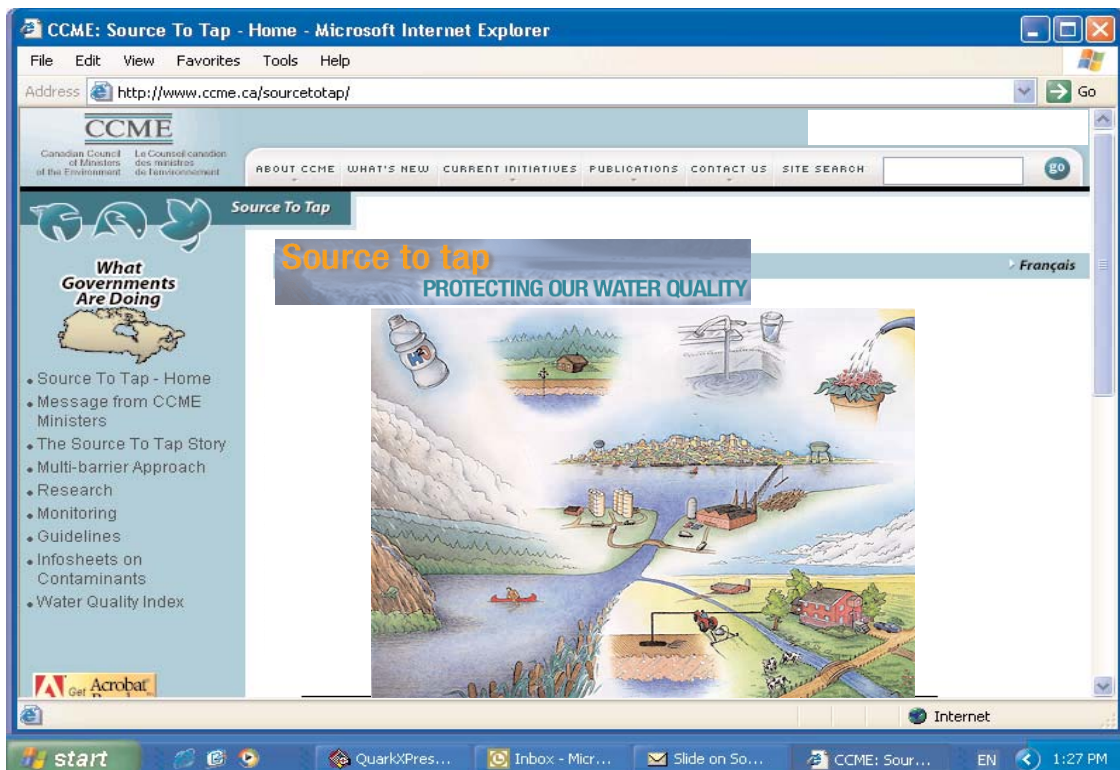
The Multi-Barrier Approach to Protecting Drinking Water

There are many issues shared by all jurisdictions in Canada that benefit from collaborative approaches. For example, federal, provincial, and territorial health and environment departments, under the auspices of the Canadian Council of Ministers of the Environment (<http://www.ccme.ca>) and of the Federal-Provincial-Territorial Committee on Environmental and Occupational Health, have developed a comprehensive source-to-tap approach to protecting water quality, which includes watershed management.

This approach is known as the multi-barrier approach to protecting drinking water. It looks at all components of a drinking water system

State-of-the-art water treatment

EPCOR, a public utility in Alberta that provides drinking water services to approximately 1 million people in the Edmonton area, has recently installed and implemented the world's largest ultra-violet (UV) disinfection system to inactivate protozoan parasites (*Giardia* and *cryptosporidium*).





Examples of RECENT STRATEGIES AND POLICY INSTRUMENTS

British Columbia Action Plan for Safe Drinking Water (<http://www.healthplanning.gov.bc.ca/protect/water.html>)

- multi-barrier, source-to-tap approach
- strengthens existing drinking water protection framework by focusing on preventing and treating contamination, as well as identifying and addressing risks for communities

Alberta Water Strategy (Water for Life) - fall 2003 (<http://www3.gov.ab.ca/env/water.cfm>)

- healthy, sustainable ecosystems
- a safe, secure drinking water supply
- reliable, quality water supplies for a sustainable economy
- knowledge necessary for effective water management decisions

Saskatchewan Water Management Framework (<http://www.se.gov.sk.ca/ecosystem/water/framework/>)

Safe and reliable water supplies within healthy and diverse aquatic ecosystems. Principles include

- preventing risks to drinking water quality with human health as the primary concern
- partnership among all levels of government and citizens in developing and implementing water management solutions
- full-cost pricing for the supply of water

Manitoba Water Strategy (http://www.gov.mb.ca/conservation/watres/water_strategy_index.html)

- development of an integrated water planning and management system
- review and consolidation of water legislation
- development of mechanisms for financing water management and planning

Ontario Safe Drinking Water Act (<http://www.ene.gov.on.ca/envision/water/sdwa/index.htm>)

- commitment to ensure Ontario has and enforces the best and toughest clean water policies
- includes establishing drinking water standards, training and certification, inspections, and enforcement

Quebec Water Policy (<http://www.menv.gouv.qc.ca/eau/politique/index-en.htm>)

- reform governance by adopting an integrated watershed management approach relying on population involvement
- recognition of water as an integral part of the collective heritage of the citizens of Quebec
- protection of public health and aquatic ecosystems with a view toward sustainable development

Newfoundland & Labrador Multi-barrier Strategic Action Plan (http://sourcetotap.ccme.ca/eng/map_eng.php?view_id=1&jurisdiction_id=6)

Source water protection of public water supply areas, implementation of regulatory tools, community-based operator training, monitoring, public reporting on water quality

Nova Scotia Drinking Water Strategy (<http://www.gov.ns.ca/enla/rmep/h2ostrat.pdf>)

- comprehensive approach to the management of drinking water based on the multiple-barrier approach
- builds on current legislation and the philosophy of continuous improvement

Northwest Territories Framework for Management of Drinking Water Quality

- Source water management is shared with Indian and Northern Affairs Canada (http://www.ainc-inac.gc.ca/nt/wrd/rred_e.html) and other co-management agencies.
- Framework is a cooperative initiative among the departments of Health and Social Services, Public Works and Government Services, Municipal and Community Affairs and Resources, Wildlife and Economic Development.
 - focus on communicating information to water users (www.pws.gov.nt.ca/waterandsanitation/index.htm)
 - review of roles and responsibilities framed in a source-to-tap approach

Canada

The Oceans Act and the Fisheries Act (http://www.dfo-mpo.gc.ca/communic/policy/dnload_e.htm#Canada%20Shipping%20Act), the updated Canadian Environmental Protection Act and the Canadian Environmental Assessment Act (<http://www3.ec.gc.ca/EnviroRegs/ENG/Default.cfm>) support integration, with their emphasis on sustainable development, integrated management, and pollution prevention within inland, coastal, and marine waters.

Canadian Council of Ministers of the Environment (<http://www.ccme.ca>)

Development and adoption of a multi-barrier approach to protecting drinking water from source to tap.



and identifies safeguards needed to provide safe drinking water. The components include source water protection, drinking water treatment, and distribution systems. The safeguards include management, monitoring, research, science and technology development, guidelines, standards and objectives, legislative and policy frameworks, and public involvement and awareness. The elements of a successful drinking water program can include state-of-the-art facilities, operation certification, an effective compliance assurance program with emergency response protocols, and measures to ensure public confidence.

Although it goes on to consider drinking water treatment and distribution, the protection of source water is the critical first barrier of the multi-barrier approach. This extends beyond controlling individual sources of contamination to address problems and solutions on a regional or watershed basis. Many provincial and territorial jurisdictions, as well as local governments, are already managing water quality programs with a watershed approach.

Water Quality Guidelines

In 1984, Canada's federal, provincial, and territorial governments began to develop national water quality guidelines to support improved assessment of water quality problems and to manage competing uses of water resources. Canadian water quality guidelines, developed collectively through the Canadian Council of Ministers of the Environment (CCME), provide water quality managers with the most current scientific and technical information concerning the effects of priority parameters on water uses. The guidelines contain recommendations for a range of parameters that 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 that include updated water quality guidelines (including those for drinking water) as well as guidelines for air, soil, sediment, and tissue residue, thus promoting 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, and have been widely endorsed internationally.

The Guidelines for Canadian Drinking Water Quality, first published in 1968, are an important tool for ensuring the safety of drinking water in Canada. They describe maximum acceptable concentrations for more than 140 microbiological, chemical/physical, and radiological contaminants in drinking water and are developed by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Environmental and Occupational Health. The guidelines are widely used by all provinces and territories, as well as internationally, to establish their own objectives, guidelines, or regulations. They provide a convenient, reliable yardstick against which water quality can be measured so that problems can be quickly identified and corrected.





Integrated Oceans Management

To address ever-increasing demands on coastal and marine environments and their resources, the 1996 federal Oceans Act established a new and innovative approach to oceans management in Canada. It calls for the development and implementation of plans for the integrated management of all activities or measures affecting estuaries and coastal and marine waters.

Canada's Oceans Strategy, released in July 2002, defines the vision, principles, and policy objectives for the future sustainable management of Canada's oceans. It supports policies and programs aimed at understanding and protecting the marine environment, supporting sustainable economic opportunities, and providing international leadership.

Institutional Arrangements

Domestic Arrangements

Canadian governments have created institutions to focus on specific water issues that have implications for more than one province or territory. For example, the Prairie Provinces Water Board manages an agreement for the equitable apportionment of eastward-flowing Prairie rivers and the consideration of water quality problems.

The Mackenzie River Basin Board helps to implement the Mackenzie River Basin Transboundary Waters Master Agreement. This forms the basis for cooperation in protecting and addressing the water quantity and quality of an aquatic ecosystem that covers one-fifth of Canada.

The Canadian Council of Ministers of the Environment (CCME), while not a governance body, is an important collaborative institution through which the provinces, territories, and federal government discuss and act on common approaches to many environmental priorities.



CCME has become a vehicle for collaboration on national water priorities, including research, the development of science–policy linkages, acceleration of the development of water quality guidelines, and better linking of networks that monitor water quality across Canada.

The Canadian Council of Fisheries and Aquaculture Ministers (CCFAM) enables the provinces, territories, and federal government to work in partnership under a broad oceans mandate. Under its Oceans Task Group, CCFAM is a vehicle for collaboration on issues of strategic importance to managing federal, provincial, and territorial efforts regarding Canada's oceans and contributing to the implementation of Canada's Oceans Strategy.

Other federal–provincial–territorial ministerial councils (e.g., Forestry, Mines, and Agriculture) play important roles in environmental protection with impacts on water as part of their focus on the sustainable development of natural resources.

In much the same way, the Federation of Canadian Municipalities (a nongovernmental organization) effectively represents municipalities' interests. Among its many activities are efforts to identify water issues and best practices that municipalities are encouraged to take into account in their own strategies, policies, and practices.



Shared Waters: Canada–United States

Canada and the United States share many waterways, from the Great Lakes, which are among the world's largest bodies of freshwater, to rivers that mark or cross the border between the two countries. These transboundary basins (see map below) are home to the majority of the Canadian population, with much of the economy directly dependent on the industrial, agricultural, transportation, and recreational benefits these water resources bring. Decisions made within the water basins of one country can have consequences for the other. This places a premium on effective governance institutions for both countries.



Canada–United States Transboundary Basins

The International Joint Commission (IJC) (<http://www.ijc.org>) has been in place for almost a century. Established under the Boundary Waters Treaty of 1909, the IJC helps anticipate, prevent, and resolve disputes between the two countries in an independent and impartial

The **International Joint Commission**, a binational organization with three members appointed by the President of the United States and three appointed by the Governor-in-Council in Canada, met for the first time in 1912. The Commissioners act as a single body seeking common solutions rather than as separate national delegates representing the positions of their governments.

manner. It also provides a mechanism for cooperation and coordination in managing shared waterways and in investigating environmental issues of mutual interest along the border. This includes issuing Orders of Approval in response to applications for use, obstruction, or diversion of boundary waters; establishing boards for managing levels and flows of boundary and transboundary waters or for monitoring and assessing water quality in these waters; and carrying out investigations at the request of Canada and the United States to better understand an issue and to make recommendations to governments.

The IJC also plays a special role in advising governments and in monitoring and assessing progress under the Canada–United States Great Lakes Water Quality Agreement. This agreement between the two countries is implemented in collaboration with the province of Ontario (through the Canada–Ontario Agreement) and Great Lakes states, with a view to restoring and maintaining the chemical, physical, and biological integrity of the Great Lakes basin.

There are also regionally based arrangements. The following are examples.



The provinces of Ontario and Quebec and the eight American states that border the Great Lakes established the Great Lakes Charter (<http://www.cglg.org>) in 1985. In the 2001 Annex to the Charter, the ten jurisdictions agreed to work toward a common decision-making standard by June 2004 to evaluate water withdrawals from the Great Lakes–St. Lawrence basin including surface and ground waters. This partnership supports the nearly century-old commitment between Canada and the United States to protect the integrity of shared waterways. These states and provinces also collaborate within the Great Lakes Commission on other economic and environmental issues related to the Great Lakes–St. Lawrence basin (<http://www.glc.org>).



The province of New Brunswick and the American state of Maine use the St. Croix International Waterway Commission to address issues related to the river system that runs along much of their shared border.



The province of Quebec and the American states of Vermont and New York have a memorandum of understanding to improve cooperation on addressing pollution problems in Lake Champlain (<http://www.lcbp.org>).



The Gulf of Maine Council on the Marine Environment was formed in 1989 to foster cooperative actions within a watershed that includes two Canadian provinces and three American states. The council has enabled collaborative work to protect and restore coastal and shellfish habitats, reduce toxic contaminants in the food chain, reduce debris, and protect fishery resource habitats.



The Conference of New England Governors and Eastern Canadian Premiers (<http://www.cmp.ca/en-main1.html>), beginning in the early 1980s, has been a leader in important and shared environmental issues. The conference adopted a pioneering and influential acid rain reduction plan inspiring appropriate actions by provincial, state, and federal governments in Canada and the United States. In 1998 the conference adopted two internationally acclaimed environmental action plans.



On the Pacific coast, the British Columbia/Washington Environmental Initiative encourages that province and state to work together on transboundary environmental problems. Their Environmental Cooperation Council has created five task forces to coordinate cross-border efforts in priority areas,

Regional cooperation is enhancing sustainable development through the Arctic Council, which brings together Canada, Denmark (including Greenland and the Faeroe Islands), Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States.

including transboundary strategies on marine plants and animals, marine protected areas, non-indigenous species, nearshore habitat protection, and control of toxic chemicals.

Shared Waters: Arctic Circumpolar Countries

The Arctic Ocean and its shelf seas represent an area of global significance in terms of their influence on global oceanic and atmospheric circulation and the unique species of the Arctic.

The Arctic Environmental Protection Strategy (1991) and Arctic Council Declaration provided the Protection of the Arctic Marine Environment Working Group (PAME) under the Arctic Council with a mandate to address policy and non-emergency response measures related to the protection of the marine environment from land- and sea-based activities. Arctic concerns are addressed in the Arctic Council's Regional Programme of Action for the Protection of the Arctic Marine Environment from Land-based Activities (RPA).

Partnerships in Action

Protection of Watersheds and Ecosystems

Federal and provincial governments have jointly developed and implemented basin-wide action plans in collaboration with communities and other stakeholders. These action plans are





designed to help resolve complex environmental issues, particularly deteriorating water quality that threatens human and ecosystem health.

During the late 1980s, the St. Lawrence River and Great Lakes basins were the focus of the first large action plans to clean up, restore, and protect ecosystems. In 1991, governments built on those experiences when they targeted the Fraser River and the Atlantic coastal area for remedial action. Each of these plans involved extensive collaborative actions at the community level to prevent pollution and to restore polluted ecosystems. While each plan was designed to meet specific regional needs and priorities, all were based on an ecosystem approach, promoting partnerships that involve all sectors, encouraging community involvement and ensuring a sound scientific basis for decision making.

Work on the Great Lakes, the St. Lawrence River, and Atlantic coastal areas have each entered subsequent phases. Plans are under development for the second phase of the Georgia Basin Ecosystem Initiative; the recommendations of the Northern River Basins Study are being implemented under the Northern Rivers Ecosystem Initiative; and unique Arctic issues are being addressed under the Northern Ecosystem Initiative. These ecosystem initiatives, as well as the integrated management initiatives that have been developed for large ocean and coastal management areas, represent some of the contributions to Canada's National Programme of Action under the 1995 Global Programme of Action for the Protection of the Marine Environment from Land-based Activities.

Protection of the Marine Environment

Canada and 108 other countries adopted the United Nations Environment Programme (UNEP) Global Programme of Action for the Protection of the Marine Environment from Land-based Activities in November 1995. The

Global Programme of Action (GPA) is successfully promoting integrated approaches to water quality management. The GPA recognizes the need for pollution prevention and conservation that addresses land-based sources of pollution of freshwater and marine systems. In June 2000, Canada was the first of the GPA signatories to release a National Programme of Action (NPA).

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. It is the only national program that addresses the interface between freshwater and saltwater, river basin and coastal environments and habitats, while incorporating the principles of integrated coastal area management within integrated water resource management. Canada's NPA provides an assessment of the state of the marine and coastal environments across Canada, the current framework for protecting these environments, and the priority actions that need to be implemented.

Water Monitoring

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 is focused on water quantity monitoring. This represents a model of international relevance to countries that share major watersheds or basins.

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. Currently, provinces, territories, and the federal government are collaborating on developing a data referencing



Hydrometric stream gauging station. Ruggles River at outlet of Lake Hazen, Quttinirpaaq National Park.

Source: Murray Jones, Water Survey of Canada

system under the auspices of the Canadian Council of Ministers of the Environment. 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.

There are also direct monitoring programs, such as the Shellfish Water Quality Protection Program, which is one of the federal government's largest water quality monitoring programs in terms of geographic coverage. Based on this monitoring, more than 11,500 square kilometres have been classified as approved for direct harvesting of shellfish.

Infrastructure

All jurisdictions in Canada are actively addressing challenges related to aging or inadequate drinking water and wastewater treatment infrastructure. The federal, provincial, and territorial governments have established funding programs that support collaboration with municipalities in improving the quality of infrastructure, with funding for water and wastewater and water supply utilities as a significant focus of these programs.

Similar large-scale investments are addressing the need for improved water and wastewater treatment facilities to meet the health and environmental needs of First Nations and Inuit communities. This 2003 federal budget provides \$600 million over the next five years, including an initial investment of \$200 million in the next two years, to upgrade, maintain, and monitor water and wastewater systems on reserves. The budget notes that the federal government will make ongoing efforts to ensure that all these communities have dependable water systems.



BUILDING AND SHARING KNOWLEDGE FOR BETTER WATER MANAGEMENT

Effective and appropriate water choices for governments and institutions have to be built on a substantial knowledge base. As steward of such a significant share of the earth's freshwater and ocean resources and home to a diverse research community in the public, private, and academic sectors, Canada has developed strengths in water-related scientific disciplines. It applies these strengths to domestic and international water priorities.

An Extensive and Diverse Network of Knowledge Partners

Canada's universities are the base for substantial amounts of research into water issues, as are the research facilities of provincial and territorial governments. Departments within Canada's federal, provincial, and territorial governments work individually and collaboratively on an extensive range of issues.

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) (<http://www.nwri.ca>) is the largest freshwater research establishment in Canada, with facilities at Burlington, Ontario (Canada Centre for Inland Waters) and Saskatoon, Saskatchewan (National Hydrology



National Water Research Institute, Burlington, Ontario.

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 River ecosystems.

The Department of Fisheries and Oceans operates nine science institutes across the country related to integrated resource management, ocean management, hydrography, fisheries management, habitat protection, species at risk, and climate.

As part of its larger mission, the Meteorological Service of Canada (MSC) supports research into weather-related issues and hydrology. The MSC is responsible for the Water Survey of Canada, which is the national agency responsible for the collection, interpretation, and dissemination of standardized water resource data and information in Canada. This includes the tracking and assessment of water quantity and quality in collaboration with provincial and territorial governments. The Water Survey of Canada is also actively involved in international projects that enable it to transfer expertise.



The Geological Survey of Canada supports research and analysis of hydrological issues, including groundwater, as an important aspect of its overall mandate. Given the increasing attention to the potential impacts of climate change on access to water in many parts of Canada, this expertise has domestic and international benefits.

The Prairie Farm Rehabilitation Administration (PFRA), a branch of Agriculture and Agri-Food Canada, is an organization with unique expertise in stewardship of the soil and water resources of prairie Canada, a region often subject to droughts. Internationally, PFRA has been involved in more than 30 projects in 16 countries. PFRA is currently managing a water quality and availability management project in Egypt; a water harvesting and institutional strengthening project in Ethiopia; and a sustainable agricultural practices project in Inner Mongolia Autonomous Region. Further information on PFRA can be found at <http://www.agr.gc.ca/pfra>.

Building International Information Partnerships

Because of Canada's water expertise, Canadian researchers are playing a leading role in water partnerships worldwide. With the growing attention to water as part of larger issues such as addressing health and environment linkages, taking action on climate change, and supporting sustainable development, these efforts have gained greater attention.

At the World Summit on Sustainable Development, Canada announced that it would increase its funding for the United Nations Environment Programme's Global Environment Monitoring System (GEMS)/Water. GEMS/Water is based at the National Water Research Institute's site in Burlington, Ontario.

GEMS/Water is a multi-faceted water science program oriented toward understanding freshwater quality issues throughout the world. The program aims to develop a knowledge base



Source: National Water Research Institute.

about freshwater that decision makers can use to make more effective choices that affect water resources. Major activities include monitoring, assessment, and capacity building. More than 100 countries participate in GEMS/Water, along with several United Nations agencies and other organizations.

All these measures build on other ongoing international partnerships to which Canada is an active contributor. For example, Canadian researchers are involved in the Global Ocean Observing System (GOOS). The objective of GOOS is to establish and sustain ocean data gathering, analysis, and predictive systems for the marine environment. It is being developed to promote an integrated approach to data collection and dissemination and is being planned and implemented in phases.

The International Development Research Centre (IDRC) and the Canadian International Development Agency (CIDA) are partners in the Water Demand Management Forum (WDMF) in the Middle East and North Africa. The forum was created to help countries in that region to address the challenge of balancing growing demand for water with limited supplies. The ultimate goal is to help decision makers formulate appropriate water



demand management policies and programs for their respective countries, supported by knowledge sharing.

Community-based Partnerships

In addition to the substantial scientific and technical strengths of its research community, Canada has developed strong community-based organizations with expertise in dealing with water resource issues at the local level by engaging citizens.

This distinct form of expertise has also been a focus for Canadian knowledge sharing, especially with developing countries and economies in transition. The Canadian International Development Agency has supported many partnerships between Canadian community-based and nongovernmental organizations and international partners.

For example, the Gaia Project is a partnership between the Sierra Club of British Columbia, the Salvadoran Centre for Appropriate Technology (CESTA) in El Salvador, and Arbolando in Bolivia. As part of the project, Canadians have worked with local partners to promote and support the development of community-based practices of reforestation and soil conservation in riparian zones. Another project links Ocean Voice International, based in Canada, with Amigos de Sian Ka'an, based in Mexico, to protect the coral reefs of the Cancun region. The initial focus is on coral reef education by developing awareness among stakeholders such as hotels, dive shops, tour guides, tourists, marinas, and local authorities about the local and global importance of coral reefs.

Expanding Understanding of Linkages between Human Health and the Environment

Human health and well-being are intimately tied to the health of the ecosystems that sustain life, with the importance of clean water being

particularly well known. However, the potential for improving health by better managing the local environment is only now beginning to be explored in the context of mainstream health programming.

At the World Summit on Sustainable Development (WSSD), Canada made another commitment that should contribute to reaching this target in launching the initiative Strengthening Health and Environment Linkages: From Knowledge to Action. This initiative is meant to assemble a comprehensive and timely base of existing knowledge on the scientific, technical, and socio-economic dimensions of health and environment linkages. This knowledge base will be constructed with the needs of policy makers in mind by highlighting best practices, key knowledge gaps, and barriers to action. Tools will then be developed to transfer the knowledge gained and help build capacity at the local, national, and regional levels to address health and environment issues, including those related to water and sanitation. The World Health Organization, the United Nations Environment Programme, and the United States are actively participating in this endeavour. Canada is actively seeking to engage other developing and developed countries to ensure that the initiative meets locally driven needs.

As a complement to this initiative, the International Development Research Centre undertook to host the International Forum on





Ecosystem Approaches to Human Health in Montreal (May 2003) . Participants from around the world can use such events to share knowledge and experiences that demonstrate how considering the health of ecosystems and of populations together improves human health and creates more sustainable ecosystems. Institutions can also consider strategies for a way forward on health and the environment.

Providing such opportunities helps to accelerate the growing interest in research that aims to identify the web of economic, social, and environmental factors that influence human health. Institutions can build on ecohealth research initiatives that have already taken place, such as projects on the mercury contamination of the Amazon or in exploring the impacts of hydroelectric dams in Côte d'Ivoire.

These developments build on other recent actions. One example was the creation by the United Nations University of the International Network for Water, Environment and Health (UNU/INWEH) late in 1996, with support from Canada.

UNU/INWEH is based in Canada, yet is a globally networked organization that undertakes capacity building and applied research on freshwater problems and their resolution, with a focus on developing countries.

UNU/INWEH has earned an excellent reputation with project recipients, UN agencies, and its delivery partners for innovative, effective capacity building in developing countries. It is implementing or has completed over 20 projects, worth US\$4.1 million, in Latin America, Africa, the Middle East, and Asia, with many others moving toward implementation.

Focus for Knowledge – Environmental Prediction

Environmental prediction has been an essential element in Canadian water science for many years, and Canada has an extensive network of

monitoring sites that capture meteorological and hydrological data. This infrastructure is being improved with advances such as a national Doppler radar network that is almost completely in place.

Advances in high performance computing and greater scientific collaboration have enabled the development of much more sophisticated modelling systems that combine Doppler radar and atmospheric and hydrological models. Canada is poised to develop quantitative precipitation estimates from Doppler radar to drive hydrological prediction systems. Aspects of this work already have been tested in a number of basins, with plans to develop this capacity nationally. Improved predictive capacities can enable the organizations that are responsible for the management of particular watersheds to take the necessary actions, such as storing or releasing water from reservoirs above dams.

Other contributions to better environmental prediction draw on a growing knowledge base related to particular regions of Canada. For example, the Mackenzie GEWEX Study (MAGS) is a set of coordinated processes, remote sensing, and modelling studies of the behaviour and the connections between the atmospheric and hydrologic systems of the Mackenzie River Basin in northern Canada. It involves a network of Canadian government and university scientists supported by many funding partners. MAGS is also an important Canadian contribution to the Global Water and





Energy Cycle Experiment (GEWEX). That major international research project is addressing a variety of water resource knowledge needs with potential global benefits. (For more information, see http://www.usask.ca/geography/MAGS/index_e.htm.)

By improving understanding of the water and energy cycle of the Mackenzie River basin, MAGS is making a contribution to understanding these cycles in cold regions more generally. This understanding is expected to lead to evaluations of human-induced climate change and natural climate variability on water resources.

Focus for Knowledge – Disaster Mitigation

Water-related disasters can take many forms—often through flooding or drought. Dealing with both kinds of disasters is a focal point for knowledge development and dissemination in Canada. Examples of dealing with flooding demonstrate how Canadian expertise works.

In the latter part of the 1990s, Canada experienced a number of major floods that affected thousands of people and resulted in substantial damage. The extremely limited loss of life and personal injury during these events was due in large measure to the knowledge base built in Canada to identify immediate disaster



The Saguenay Flood, 1996.

threats and longer-term evidence that has enabled mitigation efforts to take place.

In addition to the improved predictive work described above, research continues to expand knowledge of measures that can mitigate these disasters. These range from mapping areas to identify potential flooding zones to identifying methods to alter the movement of water into rivers, streams, and lakes. Jurisdictions are also collaborating within the Canadian Council of Ministers of the Environment to identify areas for cooperation in flood damage prevention and reduction.

In many cases, these actions demonstrate the value of integrated water resource management approaches. For example, research has taken place in Canada on the development of forest watershed management policies that both maintain freshwater supplies and sustain aquatic habitats. Long-term, multidisciplinary research in the Turkey Lakes watershed near Sault Ste. Marie, Ontario, has contributed to international policy on acid rain reduction and air quality agreements. These results have identified forest management practices that ensure the protection of aquatic ecosystems and water resources.

Focus for Knowledge – Risks Assessment

Water-related risks take many forms, as does the research to assess and address them. An increasing emphasis in Canadian research is on the risks of climate change to water and water users. 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.

One study is considering the situation in the Okanagan region of British Columbia, a relatively dry region with an important agricultural sector. The study involves three levels of government, university-based researchers, and regional stakeholders, including




water managers and irrigated agriculture, fisheries, and local stewardship groups. Work is proceeding to establish scenarios of hydrologic changes and models for water demand for crops. That information will show demand and supply impacts under different climate change situations and will provide a more substantive basis for stakeholders in the region to identify their options for water management and use.


The Ouranos program is a Quebec-based consortium focused on regional climatology and adaptation to climate change. This research initiative brings together more than 250 people in multidisciplinary research teams. They are focusing on climate sciences, statistical analysis, characterization, and impact and adaptation studies, including potential impacts on water levels. The multidisciplinary nature of Ouranos is enabling formerly isolated teams of scientists to collaborate and pull in relevant scientific data and the information that decision makers need to plan responses to climate change issues.


Focus for Knowledge – Technology Transfer

Canadian innovators in the public, private, and academic sectors have developed tools to analyze water challenges and technologies and services to address specific needs. These are the basis of many initiatives to transfer Canadian technology to developing countries and economies in transition and to help build local capacity to deal with water issues.


 Some institutions, such as the Environmental Technology Centre (ETC) have a strong technology transfer element to their mandate. ETC focuses on science and technology for environmental protection. Most of the research and development and some of the specialized scientific support of ETC take place through collaborative arrangements with the private, public, and academic sectors. These efforts attract hundreds of international visitors each year, providing direct technology transfer

to decision makers and research and development managers from all over the world.

 Other institutions like Natural Resources Canada's Mining and Mineral Sciences Laboratories (CANMET MMSL) focus on the integration and application of science into environmental technologies. Much of the technology transfer supported by these institutions takes place through consortia that bring together industry, regulators, researchers, and environmental nongovernmental organizations. For example, the Mine Environment Neutral Drainage (MEND) program has had significant impact on reducing the potential for contamination of water resources as a result of mining.

 In other cases, Canadian institutions are involved in specific projects that include technology transfer. The Northeastern Brazil Groundwater Project (PROASNE) is one of many examples around the world. This project is funded by the Canadian International Development Agency. The Geological Survey of Canada and the Geological Survey of Brazil are principal partners in the project, with the involvement of many other Brazilian institutions.

The goal of PROASNE is to reduce the impact of droughts on people in northeastern Brazil by developing groundwater resources. It is improving the mapping of groundwater resources and strengthening databases covering those resources. This technical expertise is matched with support for local water management skill development at the community level and the introduction of Canadian technologies.

 The Environmental Technical Verification of Arsenic Mitigation Project in Bangladesh is another example. The project aims to support the evaluation of the appropriateness and applicability of technologies for removing arsenic from groundwater using a rigorous technology assessment and verification protocol.



WATER AND SUSTAINABLE DEVELOPMENT AROUND THE WORLD

Water is a critical international development issue because water supply is a critical human need. It affects poverty reduction, food security, sound environmental development, and gender equality. Access to water is essential to basic health needs and to economic activities such as agriculture, food processing, and manufacturing.

Accordingly, access to water is reflected in the Millennium Development Goals that the United Nations agreed to in 2000, including the target, reinforced at the World Summit on Sustainable Development in 2002, to reduce by half the number of people without sustainable access to safe drinking water and adequate sanitation.

Action toward the Millennium Development Goals is expected to help to address situations such as the 2.4 billion people who lack adequate means of sanitation and the 30 million deaths each year from water-related diseases.

With these extensive impacts in mind, the Canadian International Development Agency

(CIDA) supports water-sector programming in many countries and through projects involving many partners. The International Development Research Centre (IDRC) has been involved in water-related research since its creation in 1970.

The programming and directions of both organizations have evolved in response to lessons learned that have informed the identification of principles for effective development: local ownership, improved donor coordination, stronger partnerships, results-based approaches, and greater coherence in other industrial country policies that can benefit the developing world and economies in transition.

CIDA has identified three other factors of central importance to the effective use of aid investments: good governance, building capacity, and engaging civil society. CIDA also recognizes that measures to achieve gender equality have to be integrated throughout development programming.

CIDA Water Sector Programming

From 1986/87 to 2001/02, total disbursements on CIDA water-related programming totalled \$600 million, which was 2.5 percent of total CIDA budgets for the period. During that



ACDI/CIDA photo.



ACDI/CIDA photo.



time, almost 50 percent of disbursements went toward strengthening institutions and building capacity to deliver adequate water-related services, while funds also went significantly to water resources protection, water and sanitation, river development, waste management and disposal, agriculture water resources, and flood prevention and control.

The projects and programs have taken many forms, in response to the needs and priorities of partners in particular regions, with many described in previous sections. In general, however, water and sanitation programs are often essential elements of larger poverty reduction efforts. They create opportunities to improve the situation of women.

CIDA work in Africa demonstrates the kind of comprehensive programming that complements the many other targeted water supply and sanitation projects in place in countries such as Ghana, Mozambique, and Malawi.

For example, water and its links to improved health and nutrition will be important elements in Canada's commitment to greatly expanded assistance for sustainable development in Africa. Canada is one of the G8 countries that are supporting the New Partnership for Africa's Development (NEPAD), a made-in-Africa plan to end the region's poverty and marginalization, through the G8 Africa Action Plan, which includes more than 100 commitments in support of NEPAD.

The plan was approved at the G8 Summit in Kananaskis, Alberta, in June 2002. For its part, Canada is allocating \$50 million over four years through the new \$500 million Canada Fund for Africa to support efforts by African governments to improve water management and access to water and sanitation.

Canada has supported regional cooperation among the countries of the Nile basin since 1993. A series of dialogue processes and conferences culminated in the creation of the

Nile Basin Initiative in 1999. Canada was one of many partners who pledged roughly US\$110 million in June 2001 to fund an initial Strategic Action Program of basin-wide projects and sub-basin joint investment projects. Some of these projects will provide information on which to develop projects for private and public sector investment, while others will foster increased cooperation and collaboration within and between Nile basin countries and emerging networks on issues related to confidence building and stakeholder involvement.

Canada will work with the Global Water Partnership, African institutions, and international partners to draw upon a wealth of Canadian experience and build upon a broad base of existing partnerships in the water sector in Africa. Activities will focus on

- participatory development of improved legislation, policies, and regulations
- definition or clarification of property rights
- identification of optimal roles and responsibilities for different levels of government, civil society, and private sector organizations
- development of capacity within relevant institutions, including targeted training of human resources
- sponsorship of dialogue and cooperation among jurisdictions that share water resources
- identification of workable approaches to financing infrastructure and service delivery, while ensuring access to vulnerable populations.



Nile Basin. (ACDI/CIDA photo: Nancy Durrell McKenna.)



The work in Africa and the Middle East reflects programs and projects in other regions. For example, CIDA is currently supporting seven projects in Asia. They include a project that is constructing and deepening wells and supporting agriculture in a region of northern Afghanistan that has been deeply affected by drought, as well as the Canada Environmental and Economic Management Project in the Philippines, which aims to improve the management of the watershed ecosystems in Cebu and Davao by strengthening governance capacity.

The nine current water and sanitation projects in the Americas are focused on expanding and improving access to water and sanitation services; initiating or enhancing sustainable management of watersheds and aquifers; and strengthening the capacity of water authorities and institutions to manage, regulate and plan water and sanitation sector investments. Countries where these water-related investments are now focused include Honduras, Peru, Bolivia, and Dominica.

Canada is also at work with partners in Central and Eastern Europe on a variety of water-related issues. Many of the projects in countries such as Latvia, Ukraine, Romania, Poland, Albania, and Uzbekistan are assisting partners to improve their water resource and environmental management capacities. As in Canada,



ACDI/CIDA photo.

there is some interest in moving toward more integrated approaches to address planning and resource use issues in particular river basins, as Poland is for the Oder River and Ukraine is in the Dnipro basin. Some of the projects include a strong orientation toward developing the skills and expertise of local officials in water resource roles.

IDRC Water Sector Activities

The International Development Research Centre (IDRC) began its water activities in 1970 with a focus on supply technologies such as inexpensive, simple-to-use hand-pumps. Since then, it has invested \$76.8 million in 367 water-related projects, with 35 projects now active.

Today, the focus has shifted to demand management and the devolution of water management to lower levels of government and communities. IDRC works in partnership with local scientists and communities from Africa, the Middle East, Asia, Latin America, and the Caribbean to find solutions to water scarcity.

In 2002, IDRC published *Water: Local-level Management*, a book of lessons learned on the design, execution, and evaluation of local water policy. A Website offers details on IDRC's three approaches to local water management: small-scale water supply, wastewater treatment and reuse, and watershed management and irrigation (http://www.idrc.ca/water/index_e.html).

While IDRC has many research, development, and knowledge-sharing activities, some of which are described elsewhere in this document, a few examples indicate some recent efforts.

Wastewater Treatment and Reuse for Food Security

IDRC supports research and development activities that increase the food security and income of the poor in the cities while



maintaining public health and a clean urban environment. Wastewater treatment and recycling is an important component of that research since most of the 800 million urban farmers worldwide recycle waste, reuse water, and put idle land to productive use.

In particular, IDRC supports research on greywater reuse systems in various regions of the world, including North Africa and the Middle East. It has funded projects in Palestine, Jordan, and Lebanon that help people harvest water at the household level. The projects have helped produce affordable and nutritious food for the urban poor.

Water Governance

IDRC has identified water and governance as a key issue in natural resources management, particularly in Latin America and the Caribbean. Several trends and factors are currently increasing the likelihood of a serious water crisis in the region over the medium and long term. Therefore, IDRC is supporting research that contributes to awareness of the issue, and addresses the lack of knowledge and difficult access to information on the part of people involved in water resource management.



Latin America and the Caribbean. To address the increasing likelihood of a serious water crisis in Latin America and the Caribbean over the medium and long-term, IDRC is supporting a range of projects.

For instance, IDRC works with a research team from Ecuador to define a cluster of solutions that could resolve the conflicts over water in the El Angel watershed in the Northern Andes without risking irrevocable ecosystem damage. Information the research team has generated has helped create a chain reaction that has helped to resolve a conflict over water between two municipalities; led to a new approach to water allocation in the area; initiated a growing

popular movement among local people in favour of protecting the *paramo* (the ecosystem of the Northern Andes); renewed interest in improving irrigation infrastructure; and made a slight but significant shift in the region's entrenched power dynamics.



South Asia. IDRC has supported four years of collaborative investigation by Indian and Nepali researchers on local water management needs and options. This project was conceived and designed in response to the conflict between proponents of large dams or interbasin transfer projects and others advocating more distributed local solutions to water supply needs. The research team is sharing research results and innovative local water management models in various forums to facilitate dialogue between key stakeholders and promote institutional change.



CANADIAN WATER WEBSITES

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

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/

Quebec

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

Saskatchewan

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

Yukon

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

Federal Websites

Environment Canada

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

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>

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

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/>

British Columbia Ministry of Health Planning, Drinking Water Program

<http://www.healthplanning.gov.bc.ca/protect/water.html>

CCME, Source to Tap, Newfoundland and Labrador

http://sourcetotap.ccme.ca/eng/map_eng.php?view_id=1&jurisdiction_id=6

Council of Atlantic Premiers

<http://www.cmp.calen-main1.html>

Council of Great Lakes Governors

<http://www.cglg.org>

Environment Canada, Environmental Acts and Regulations

<http://www3.ec.gc.ca/EnviroRegs/ENG/Default.cfm>



Environnement Québec, Quebec Water Policy

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

Fisheries and Oceans Canada, Acts, Orders and Regulations

http://www.dfo-mpo.gc.ca/communic/policy/download_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

Manitoba Conservation, Water: A Proposed Strategic Plan for Manitoba

http://www.gov.mb.ca/conservation/watres/water_strategy_index.html

Northwest Territories Water Resources Division

http://www.ainc-inac.gc.ca/nt/wrd/rred_e.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/sdwal/index.htm>

Prairie Farm Rehabilitation Administration

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

Saskatchewan Environment, Water Management Framework

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

