

**Report of the Canadian Delegation to the IHP-Council  
18<sup>th</sup> Session of the Intergovernmental Council  
Paris, 9-14 June 2008**

**Key National Activities**

Canada has completed a number of key hydrological programs and initiatives over the past few years, and has added some new key initiatives to its list of ongoing programs and activities. This overview report provides some examples (not all inclusive) of key Canadian hydrological programs and activities selected from a cross-section of Canadian water-related programs and research initiatives that relate to UNESCO-IHP priorities and focal areas.

**Completed Programs/Assessments**

**Canadian**

*Environment Canada's National Scientific Assessments*

The National Water Research Institute (NWRI), which has been expanded recently to include other Environment Canada water groups and is now known as the Water Science and Technology Directorate (WSTD), leads and publishes scientific assessments of priority freshwater issues in Canada. Written by experts from NWRI, government (federal, provincial, territorial, municipal), universities and industry, these assessments provide a synthesis of current scientific knowledge, trends, and information and program needs with the intent of providing knowledge to assist water science decision-makers, managers and the research community in setting research priorities, making informed decisions, and in developing sound management policies and practices. Currently, there are eight reports in the series:

1. Threats to Sources of Drinking Water and Aquatic Ecosystem Health in Canada (2001)
2. National Assessment of Pulp and paper Environmental Effects Monitoring Data (2003)
3. Threats to Water Availability in Canada (2004)
4. A Decade of Research on the Environmental Impacts of Pulp and Paper Mill Effluents in Canada (1992-2002) (2004)
5. National Assessment of Pulp and Paper Environmental Effects Monitoring Data: Findings from Cycles 1 through 3 (2005)
6. Research into Action to Benefit Canadians (2005)
7. Microbial Source Tracking in Aquatic Ecosystems: The State of the Science and an Assessment of Needs (2006)
8. Pharmaceuticals and Personal Care Products in the Canadian Environment: Research and Policy Directions (2007)

*National Agri-Environmental Standards Initiative*

The National Agri-Environmental Standards Initiative (NAESI) was a four-year (2004-2008) project between Environment Canada (EC) and Agriculture and Agri-Food Canada (AAFC) and

is one of many initiatives under AAFC's Agriculture Policy Framework (APF). The goals of the National Agri-Environmental Standards Initiative were to:

- Establish non-regulatory national environmental performance standards (with regional application) in four thematic areas (air; biodiversity; pesticides; water) that support common EC and AAFC goals for the environment;
- Evaluate standards attainable by environmentally-beneficial agricultural production and management practices; and
- Increase understanding of relationships between agriculture and the environment.

Under NAESI, agri-environmental performance standards (i.e., outcome-based standards) were established that identify both desired levels of environmental condition and levels considered achievable based on available technology and practice. These standards will be integrated by AAFC into beneficial agricultural management systems and practices to help reduce environmental risks. Additionally, these will provide benefits to the health and supply of water, health of soils, health of air and the atmosphere; and ensure compatibility between biodiversity and agriculture.

#### *Northern River Ecosystem Initiative*

The Northern River Ecosystem Initiative (NREI), 1997-2004, has provided new scientific knowledge in response to specific recommendations from its predecessor, the Northern River Basins Study (NRBS), 1990-1996. The two initiatives together provide a remarkable body of science which is, and will continue to be, used by resource managers responsible for economic and environmental sustainability in the northern watersheds of Alberta. The NREI focused its investigative efforts on improving our understanding related to ecological considerations of changes in river flow, effect of climate change on flow, ecological responses to pollution and cumulative effects, vulnerability of drinking water quality, and to a lesser degree, wildlife (birds) response to large scale changes within the watersheds. Commensurate with the undertakings of NREI, provincial and territorial governments, First Nation and Métis communities, and other administrative organizations such as the Mackenzie River Basin Board, undertook policy, regulatory, and watershed initiatives towards achieving sustainability and providing reliable drinking water quality. The production and release of the *NREI Final Report, NREI Synthesis Report and the NREI Key Findings* document, concludes more than a decade of research within the northern river ecosystems studied. The NREI and NRBS have left a legacy of knowledge and awareness of the environment of the northern river basins, providing a foundation for a sustainable environment.

#### *NRCan National Climate Change Impact Assessment*

Drawing upon an assessment team comprising many experts from across Canada (from federal, provincial, territorial and First Nations governments, and universities), Natural Resources Canada (NRCan) through its Climate Change Impacts and Adaptations Program has completed an assessment of climate change impacts and adaptations in Canada. Entitled "*From Impacts to Adaptation: Canada in a Changing Climate 2007*", the assessment reflects the advances made in understanding Canada's vulnerability to climate change during the past decade. Through a primarily regional approach, this assessment discusses current and future risks and opportunities

that climate change presents to Canada, with a focus on human and managed systems, and highlights key issues facing each region of the country in a policy-relevant manner. The assessment is based on a critical analysis of existing knowledge, drawn from the published scientific and technical literature (peer-reviewed and grey literature) and from expert (including traditional) knowledge. The current state of understanding is presented, and key knowledge gaps are identified. Advances in understanding adaptation, as well as examples of recent and ongoing adaptation initiatives, are highlighted throughout the report.

## **Contributions to International Programs/Assessments**

### *Arctic Climate Impact Assessment*

The *Arctic Climate Impact Assessment* (ACIA) is the first comprehensive, integrated assessment of climate change and ultraviolet (UV) radiation across the entire Arctic region. The ACIA was launched in 2002 as an international project of the Arctic Council and the International Arctic Science Committee (IASC) and involved >500 scientists and experts (including Arctic indigenous groups). This assessment was completed and published by the Cambridge University Press in 2005 (18 chapters; 1042 p). The assessment had three main objectives:

- To provide a comprehensive and authoritative scientific synthesis of available information about observed and projected changes in climate and UV radiation and the impacts of those changes on ecosystems and human activities in the Arctic. The synthesis also reviews gaps in knowledge and the research required to fill those gaps. The intended audience is the international scientific community, including researchers and directors of research programs.
- To provide an accessible summary of the scientific findings, written in plain language but conveying the key points of the scientific synthesis. This summary, the *ACIA Overview Report*, is for policy makers and the general public.
- To provide policy guidance to the Arctic Council to help guide the individual and collective responses of the Arctic countries to the challenges posed by climate change and UV radiation. The *ACIA Policy Document* accomplishes this task.

Canada was a major contributor to the ACIA assessment: 3 Canadians sat on the Assessment Steering Committee; 6 Canadians were Lead or Co-lead Authors; more than 30 Contributing Authors and 40 Case Study and Consulting Authors (many of which are First Nations and Inuit) were also Canadian. It is notable that much of the work that contributed to Chapter 8 – Freshwater Ecosystems and Fisheries led directly to the *AMBIO Special Issue: Climate Change Impacts on Arctic Freshwater Ecosystems and Fisheries* (Editors: F.J. Wrona; T.D. Prowse; and J.D. Reist).

### *IPCC 4<sup>th</sup> Assessment and Water Theme Reports*

The Fourth IPCC Assessment Report "Climate Change 2007", comprising 4 volumes and various contributions, was completed with the fourth and last volume being the Synthesis Report (AR-4) which was launched in November 2007. Many Canadian scientists and experts provided significant input to this report, some of whom were acknowledged as sharing, as part the IPCC, the Nobel Peace Prize "for their efforts to build up and disseminate greater knowledge about man-made climate change and to lay the foundations for the measures that are needed to

counteract such change". The ceremony was held last November and the IPCC was awarded jointly with former Vice President of the United States Al Gore.

Following on from the AR-4, the "Technical Paper on Climate Change and Water" was released by the IPCC in April 2008 and it constitutes an important addition to the 4<sup>th</sup> IPCC Assessment Report. It is notable that Terry Prowse, as a member of the IPCC Working Group II Technical Support Unit, was a co-author of this report.

### *Mackenzie GEWEX Study*

The Mackenzie GEWEX Study (MAGS) was a collaborative multidisciplinary Research Network comprising nearly 80 government and university scientists from across Canada with expertise in many fields including hydrology, climatology, meteorology, atmospheric physics, remote sensing, computer science, civil engineering, and physical geography. After more than ten years of intensive and extensive research, MAGS successfully concluded in 2005. The overall goals of MAGS were to understand and model the response of the energy and water cycle in northern Canada to climate variability and change, to define the impacts of its atmospheric and hydrological processes and feedbacks on the regional and global climate systems, and to apply improved predictive capabilities to climatic, water resource, environmental and societal issues in the cold regions. Through Phase 1 (1994-2000), MAGS gained good understanding of the atmospheric and hydrological processes that influence the cold regions, and improved insights into the energy and water system of the Mackenzie Basin which is experiencing a distinct warming trend. Phase 2 (2001-2005) concentrated on the modelling of all major components of the physical system and application of unified knowledge and predictive capability to tackle water resource problems in the Mackenzie Basin as well as other parts of Canada.

### *Second International Conference on Arctic Research Planning (ICARP II)*

The goal of ICARP is to prepare Arctic research plans to guide international cooperation over the next 10-15 years. ICARP brings together senior and young scholars, policy experts, Arctic indigenous and other residents, science and land managers as well as funding agencies to discuss and extend the draft science plans taking special note of the problems, priorities and concerns of those who live in or near the Arctic. The Second International Conference on Arctic Research Planning (ICARP II) was held in Copenhagen, Denmark from 10 November through 12 November 2005 and brought together over 58 scientists, policy makers, research managers, indigenous peoples, and others interested in and concerned about the future of arctic research. Through plenary sessions, breakout sessions and informal discussions, conference participants addressed long-term research planning challenges documented in twelve draft research plans. Following the conference 11 thematic Working Groups modified the plans to reflect input from the conference discussions and input from experts at large. Canadian scientists and experts contributed significantly to ICARP II: two Canadians (Barry Goodison; Geoff Holland) sit on the ICARP Steering Committee; Terry Prowse was the Chair of Working Group 7 - Terrestrial and Freshwater Biosphere and Biodiversity; and at least one Canadian was a member of each Working Group.

Following an ICARP II Implementation Workshop, which was held at the Alfred Wegner Institute, Potsdam, Germany (November 19-22, 2006), the plan was adopted as a key thematic area for the World Climate Research Program, Climate and the Cryosphere, CliC. The Chair of the ICARP II Working Group 7 (Terry Prowse) was also asked to join the Scientific Steering Group of CliC to help promote the research objectives outlined in the plan. Canada has adopted some key foci of the plan to guide its involvement with Arctic-HYDRA during the IPY and is now in the process of extending its international involvement with the Japanese *via* Asia-CliC and possible collaboration in some key Canadian northern basins.

## **New and Ongoing Programs/Activities**

### *Agriculture and Agri-foods Canada Programs*

Agriculture and Agri-foods Canada (AAFC) and its Prairie Farm Rehabilitation Administration (PFRA) Branch continue their national roles for environmental and water management programming related to Canadian agriculture and water. Some of their key programs and support related to agriculture and water include: Environmental Farm Planning; National Farm Stewardship Program; National Water Supply Expansion Program; Pesticide Risk Reduction and Minor Use Programs; Information Gaps in Water Quality and Nutrients; National Land and Water Information Service; Integrated Pest Management Research; Prairie Shelterbelt Program; Greencover Canada Program; Watershed Evaluation of BMPs; National Agri-Environmental Health Analysis and Reporting Program; Technical Support for Rural Water Supplies; and Water and Climate Information Products.

### *ArcticNet*

ArcticNet is a Network of Centres of Excellence of Canada that brings together scientists and managers in the natural, human health and social sciences with their partners in Inuit organizations, northern communities, federal and provincial agencies and the private sector to study the impacts of climate change in the coastal Canadian Arctic. The central objective of ArcticNet is to contribute to the development and dissemination of the knowledge needed to formulate adaptation strategies and national policies to help Canadians face the impacts and opportunities of climate change and globalization in the Arctic. Through integrated regional impact studies (more than 20 current studies) on societies and on marine and terrestrial (including freshwater) and coastal ecosystems in Canada's northern regions, ArcticNet offers a unique multi-disciplinary and cross-sectorial environment to train the next generation of specialists, from north and south, needed to manage the Canadian Arctic of tomorrow.

### *Canadian Drought Research Initiative*

The Canadian Drought Research Initiative (Canada DRI) is a Research Network that brings together many university and federal/provincial government researchers to address Canadian drought with expertise encompassing the atmospheric, hydrologic, land surface, and predictive aspects of droughts at a variety of spatial and temporal scales. Because of the enormous economic, environmental and societal impacts, the Drought Research Initiative (DRI) was established in 2005 to coordinate and integrate drought research in Canada. To make progress on

this critical issue, DRI is focusing on the recent drought (1999-2004/05) over the Canadian Prairies. The objective of DRI is to better understand the physical characteristics of and processes influencing Canadian Prairie droughts, and to contribute to their better prediction.

### *Canadian Water Network*

The Canadian Water Network (CWN) was created as one of Canada's Networks of Centres of Excellence (NCE), to build a network that develops opportunities related to the provision of safe, clean water. In collaboration with universities, government and industry, the CWN has developed a variety of scientific projects and initiatives that address key water-related issues facing Canadians while embracing strong multidisciplinary and multi-sectoral partnerships. The CWN applies scientific excellence, communication and network activities within three programs that focus on national issues of strategic importance to the Canadian economy and public good: (1) Protecting Watersheds and Ecosystems; (2) Protecting Public Health; and (3) Ensuring Sustainable Water Infrastructure.

### *Environment Canada's Priority Ecosystem Programs/Initiatives*

Environment Canada has added a new initiative on Lake Winnipeg to its National Network of Regional Ecosystem Initiatives, all of which have a focus on water resources and employ a multi-stakeholder approach to address regional/watershed-based research, science and policy issues. Examples of major initiatives include:

- Atlantic Coastal Action Program, is centred on community-based leadership and delivery to address environmental and sustainable development issues in ecosystems involving watersheds and coastal areas throughout Atlantic Canada;
- St. Lawrence Program, which addresses quantity and quality aspects of river flow originating from the upstream Great Lakes system;
- Great Lakes Program, which addresses water quality/contaminants and the development of remedial action plans. This program has links to International Joint Commission priorities about shared water resources between Canada and the United States;
- Northern Ecosystem Initiative, located in the Northwest Territories, Nunavut and Yukon, with some key components that address climate-change impacts on the hydrology and ecohydrology of cold-regions aquatic ecosystems;
- Georgia Basin Action Plan, located primarily in the Fraser River Basin of British Columbia, that focuses on water quality/quantity and integrated watershed management; and
- Lake Winnipeg Basin Initiative, which take a science-based approach to better understand how to solve the serious water quality issues facing this vital watershed.

### **Other Federal Water Programs**

#### *Ag Canada – NLWIS (National Land and Water Information System)*

The National Land and Water Information Service is an Internet-based service being developed over the next four years to provide on-line access to agri-environmental information to help Canadians make responsible land-use decisions. The federal government is investing \$100.1 million to implement the new service. The first phase of project implementation began in May

2005. When the project is completed in 2009, the National Land and Water Information Service will be recognized as Canada's source of information, analysis and interpretation of agri-environmental data on land use, soil, water, climate and biodiversity to assist land-use decision makers. These land-use decision makers include governments, community groups, researchers, producers and industry.

Development of the National Land and Water Information Service will build on other efforts to reduce agricultural risks and better use Canada's land, soil, water and biodiversity resources. Among these efforts are initiatives to: (i) identify beneficial management practices (BMPs) that protect land from wind and water erosion, improve water supply and quality, enhance biodiversity and increase carbon sequestration in the soil; (ii) help producers adopt these BMPs for soil, nutrient and livestock management; and (iii) measure and track the environmental performance of Canadian agriculture.

#### *International Joint Commission*

The International Joint Commission (IJC), established under the 1909 Boundary Waters Treaty, continues to prevent and resolve disputes between the United States of America and Canada, and pursue the common good of both countries as an independent and objective advisor to the two governments. The IJC acts impartially in reviewing problems and deciding on issues, rather than representing the views of their respective governments, leading to decisions that are both ethical and equitable. Through the IJC, the two countries continue cooperate to manage shared waters wisely and to protect them for the benefit of today's citizens and future generations.

#### *International Polar Year*

International Polar Year (IPY) 2007-2008 marks the largest-ever international program of scientific research focussed on the Arctic and Antarctic regions. Canada is playing an important global leadership role for IPY, and beyond, through the support of multi-national research collaborations, the participation of leading Canadian scientists and its role as host to top research teams from around the world. Canada has developed an ambitious program for IPY, providing support of \$150 million for 44 Canadian IPY projects, for its scientific effort to create a more complete scientific understanding of the North that can be applied to address issues related to our environment and the well-being of Northern communities. Highlights of the Government of Canada Program for IPY include:

- A targeted science and research program that will build on and support existing programs, networks and facilities to focus on two important challenges for Canada's northern regions;
- A training program to actively engage young scientists and Northern communities in on-the-ground training in science and research activities. This will lead to a new generation of polar scientists, particularly Northerners and Aboriginal peoples, to carry on strong northern research programs in the decades to follow.
- A communications and outreach program will focus on raising awareness of Northern and polar regions and issues, and celebrating northern, Aboriginal and scientific achievements. IPY will involve northern residents in science and research planning and activities, through training programs, communications activities, and in the management and administration of the program.

### *Improved Processes and Parameterisation for Prediction in Cold Regions*

Improved Processes and Parameterisation for Prediction in Cold Regions (IP3) is a Canada-wide Research Network (comprised of several dozen investigators and collaborators from across Canada, the US, and Europe) devoted to an improved understanding of surface water and weather systems in cold regions, particularly in Canada's Rocky Mountains and western Arctic regions. These issues are of key importance to agriculture and urban and industrial development in the Prairies and northwest. IP3 will develop an improved understanding of cold regions hydrometeorology and test advances in atmospheric and hydrological prediction in the Rocky Mountains and the Arctic along a transect of high latitude and high altitude instrumented research sites that characterize the cold regions of Canada. IP3 is a component of the International Polar Year (IPY), the Climate and Cryosphere project (CliC) of the World Climate Research Programme, and the International Decade for Prediction in Ungauged Basins (PUB).

### *NRCan Groundwater Program*

Groundwater is important to health, economy and ecosystems in Canada. It provides drinking water to about one third of all Canadians and up to 80% of the rural population. It has been routinely surveyed since early last century, yet groundwater has not been mapped in a systematic way across the country. The NRCan Groundwater Mapping program, a current federal groundwater initiative, aims to establish a conceptual framework of national, regional and watershed-scale groundwater flow systems. The first phase of the program “Groundwater Inventory” was conducted from 2003 to 2006 and focused on inventory assessment of Canada’s most strategic aquifers to help governments better understand the quantity and quality of existing water resources and the dynamics and vulnerability of key regional aquifers. All information and results provided by the first phase are available on the internet through the National Groundwater Database. The second phase of the program (2006-2009) “Groundwater Mapping Program” essentially follows the same vision of the first phase with some modifications on the regional aquifers studied, enhanced emphasis on data and information with open and user-friendly, easy access to the data and information products, as well as the production of a book with a synthesis of knowledge of the groundwater resources in Canada. A third phase for the Groundwater Program after 2009 is also intended.

### *Western Canadian Cryospheric Network*

The Western Canadian Cryospheric Network (WC<sup>2</sup>N) is a consortium of six Canadian universities, two American universities and government and private scientists who are examining the links between climatic change and glacier fluctuations in western Canada. The aim of WC<sup>2</sup>N is to understand the behaviour of the climate system and its effects on glacier mass balance in the mountain ranges of British Columbia and western Alberta. This research, without duplication, will be aligned with other proposed and ongoing cryospheric research and monitoring networks in Canada and elsewhere. Taken together, these networks and the resultant synergies will yield a nationwide assessment of the past, present, and future response of Canadian glaciers to changing climates.

## *National Water Atlas*

Agriculture and Agri-foods Canada and Environment Canada are co-leading a new federal initiative with the objective of creating a National Water Atlas (NWA) for Canada. The vision for the NWA is a web-based, dynamic Water Atlas of Canada that presents Canadians with cartographic information on water and water-related resources and issues, synthesized from multiple sources. The purpose is to provide improved access and consistent representation by way of thematic maps and related text on hydrologic information about Canada and to increase public awareness of the fact that water is a precious and limited resource. The target for the contents of the Atlas and its presentation will be useful in providing background information to meet the demand expressed through public interest and education with necessary linkage to more detailed and advanced information to meet the demand expressed for science, economy and policy. The steering committee and project management implementation involves several federal departments, each having key roles and activities related to water resources. These include: Environment Canada; Agriculture and Agri-foods Canada; Natural Resources Canada; Statistics Canada; and Fisheries and Oceans. Current working group thematics are: water availability; hydrometeorology and climate; water quality; water consumption and use; and IT/Geomatics support.

## **Major Hydrological Sciences Societies**

### *Canadian Geophysical Union - Hydrology Section*

Established in 1993, the Canadian Geophysical Union - Hydrology Section (CGU-HS) brings together scientists from all branches of hydrology. Its aims and objectives are to: (i) promote hydrology as a geophysical science; (ii) advance the understanding and application of hydrology and related sciences; (iii) initiate and participate in research and education programs in hydrology, (iv) promote national and international cooperation among scientific and engineering organizations working in hydrology; and (v) disseminate research results and knowledge to the public through scientific discussion, meetings and conferences, publications and other means of information and technology transfer. The Hydrology Section also acts as the umbrella organization for the CGU-HS IASH Nominating Committee.

### *Canadian Water Resources Association*

The Canadian Water Resources Association (CWRA) is a national organization of individuals and organizations interested in the management of Canada's water resources. The membership is composed of private and public sector water resource professionals including managers, administrators, scientists, academics, students and users. CWRA objectives are to: (i) stimulate awareness and understanding of Canada's water resources; (ii) encourage recognition of the high priority and value of water; (iii) provide a forum for the exchange of information and opinion relating to the management of Canada's water; and (iv) participate with appropriate agencies in international water management activities. Association activities include organizing conferences, symposiums and workshops dealing with a wide range of water management issues, quarterly publication of Canadian Water Resources Journal and the newsletter, Water News, as well as publishing papers and reports. Affiliated with CWRA are the Canadian National Committee on

Irrigation and Drainage (CANCID), Canadian Society for Hydrological Sciences (CSHS), and the Project WET which is an international, interdisciplinary, water education program for formal and non-formal educators of kindergarten to grade 12 students intended to supplement a school's existing curriculum.

#### *Canadian Meteorological and Oceanographic Society*

The Canadian Meteorological and Oceanographic Society (CMOS) is the national society of individuals and organizations dedicated to advancing atmospheric and oceanic sciences and related environmental disciplines in Canada. The Society's aim is to promote meteorology and oceanography in Canada, and it is a major non-governmental organization serving the interests of meteorologists, climatologists, oceanographers, limnologists, hydrologists and cryospheric scientists in Canada. The Society addresses a broad range of national and international meteorological and oceanographic concerns including weather and weather extremes, global warming, ozone depletion and surface air quality and their effects on all aspects of life in Canada including forestry, agriculture and fisheries. Special interest groups in the Society consider meteorological aspects of hydrology, agriculture, forestry, meso-scale meteorological phenomena and operational meteorology.

#### *Canadian National Chapter – International Association of Hydrogeologists*

The Canadian National Chapter (CNC) of the International Association of Hydrogeologists (IAH) is an organization that offers members a variety of talks, seminars, networking opportunities, and conferences in areas related to groundwater resources sciences and management. The Canadian chapter consists of hydrogeologists, scientists, engineers and water resource managers. Details of the key activities of the CNC-IAH can be found at [www.iah.ca](http://www.iah.ca).

#### **Canadian National Committee – UNESCO International Hydrological Program**

The Water Sciences and Technology Directorate of Environment Canada has rejuvenated and is actively working on strengthening the role of the Canadian National Committee for IHP (CNC-IHP). With IHP-Phase VII (2008-2013) and its new themes and focal areas in mind, the committee membership has been strategically expanded. The committee now consists of:

- Chair/Chief Delegate, Frederick J Wrona, Director, Aquatic Ecosystem Impacts Research Division, Environment Canada
- Senior Science Representative, Terry D Prowse, Senior Scientist, Environment Canada & Canada Research Chair in Climate Impacts on Water Resources, Water and Climate Impacts Research Centre, University of Victoria
- Academia Member, John W Pomeroy, Canada Research Chair in Water Resources and Climate Change, University of Saskatchewan
- Other Government Department Member(s), Alfonso Rivera, Chief Hydrogeologist/Program Manager, Natural Resources Canada (NRCan)
- IAHS Member, Gordon Young, President-elect, International Association of Hydrological Sciences (IAHS)
- CWRA Member, Russell Boals President, Canadian Water Resources Association (CWRA)

- CGU-HS Member, Jim Buttle, President, Canadian Geophysical Union – Hydrology Section (CGU-HS)
- Canadian UNESCO Contact, Dominique Potvin, Chargée de programme, Sciences naturelles/Natural Sciences, Programme Officer, Commission canadienne pour l'UNESCO/Canadian Commission for UNESCO
- Industry Representative - TBD
- Secretary, Peter di Cenzo, Manager, Canadian IHP Secretariat

The Secretariat and leadership for the CNC will continue through the National Water Research Institute, Canada's largest federal water research organization. The Committee is supported by a Secretariat located at the National Hydrology Research Centre, Environment Canada, Saskatoon, funded by Water Sciences and Technology Directorate (Environment Canada) which:

- provides administrative support to the Canadian National Committee
- provides an easily accessible source of information on, and related to, IHP for government, university and non-government scientists, and the general public
- distributes official IHP announcements and documents to the Canadian hydrological community

A report on Canadian hydrological activities relating to IHP-VI (2002-2007) is near completion. The purpose of this report (more than 150 pages) is to provide IHP and our international colleagues key examples (not all inclusive) of Canadian hydrological activities related to IHP-VI and its themes and focal areas, and to direct the reader to easily accessible key documents and websites for more detailed and additional information.

In the coming year it is planned to create a Canadian IHP website, and produce publicity materials such as brochures, pamphlets and posters.

### **Contributions to UNESCO Sponsored Workshops**

*UNESCO's IHP and the OAS hold 5<sup>th</sup> International Workshop of the ISARM Americas Project*

The 5th International Workshop of the ISARM (Internationally Shared Aquifer Resources Management] Americas project (UNESCO/OAS ISARM Americas Programme) was held September 17-20, 2007, in Montréal, Canada. The workshop, organized by Alfonso Rivera of Natural Resources Canada, was composed of many events. It was coordinated by UNESCO's International Hydrological Programme (IHP) and the Organization of American States (OAS). The workshop brought together national coordinators of the 20 countries participating in the project and international experts from UNESCO, the International Network of Basin Organizations (INBO) and the International Groundwater Resources Assessment Centre. Ambassador Chusei Yamada, Special Rapporteur of the UN's International Law Commission (ILC) for the topic shared natural resources, also participated in the workshop.

Cooperation between neighbouring countries in the Americas led to the identification of 69 transboundary aquifers. These results are published in the book launched at the workshop (see ISARM book series below). The workshop also provided an opportunity to listen to several international presentations, such as those from Jean-François Donzier on INBO and the EU

Water Framework Directive and Ambassador Yamada on the draft articles on the law of transboundary aquifers. The conference was a great success, as witnessed by the goals reached and comments made by participants during and after the workshop.

### **Contributions to UNESCO Hydrological Publications**

#### *Urban Water Cycle Processes and Interactions*

By **J. Marsalek**, B. Jiménez-Cisneros, M. Karamouz, P.-A. Malmquist, J. Goldenfum and B. Choca, UNESCO IHP Urban Water Series – UNESCO Publishing / Taylor & Francis

Effective management of urban water should be based on a scientific understanding of the impact of human activity on both the urban hydrological cycle – including its processes and interactions – and the environment itself. Such anthropogenic impacts, which vary broadly in time and space, need to be quantified with respect to local climate, urban development, cultural, environmental and religious practices, and other socio-economic factors.

Urban Water Cycle Processes and Interactions represents the fruit of a project by UNESCO's International Hydrological Programme on this topic. The volume begins by introducing the urban water cycle concept and the need for integrated or total management. It then explores in detail the manifold hydrological components of the cycle, the diverse elements of urban infrastructure and water services, and the various effects of urbanization on the environment – from the atmosphere and surface waters to wetlands, soils and groundwater, as well as biodiversity. A concluding series of recommendations for effective urban water management summarize the important findings set forth here.

#### *Water for Our Children: Systems Methods and Tools for Better Management of Water Resources*

By **Slobodan P. Simonovic**

Published jointly by UNESCO IHP and EarthScan (James & James, UK)

Water resources management is increasingly interdisciplinary and must take into account complex socioeconomic factors and environmental variables. This book describes the 'systems approach' and its application to contemporary water resources management, focusing on three main sets of tools: simulation, optimization and multi-objective analysis. This approach is presented within the context of sustainable planning and development under conditions of uncertainty. The book combines theory with many practical examples, as well as including programs and exercises on an accompanying CD-ROM. It composes both an advanced text for students of water resources and civil or environmental engineering and a practical guide for professionals.

#### *Aquatic Habitats in Sustainable Urban Water Management (Science, Policy and Practice)*

Edited by Iwona Wagner, **Jiri Marsalek** and Pascal Breil

UNESCO-IHP Urban Water Series – UNESCO Publishing / Taylor & Francis

Aquatic Habitats in Sustainable Urban Water Management – the result of collaboration between UNESCO’s International Hydrological Programme and its Man and the Biosphere Programme – aims at improving our understanding of aquatic habitats, related ecosystem goods and services, and conservation and sustainable use – with a special focus on their integration into urban water management. The first part of this volume reviews basic concepts and challenges in urban aquatic habitats, as well as strategies for their management integration. The second part examines technical measures related to habitats management and rehabilitation, along with their incorporation into urban planning and their role in human health. The final part looks at current urban aquatic habitat issues and practical approaches to solving them through the lens of case studies from around the globe.

### **Status and Future Directions**

Through its various hydrological programs led or funded by Government Departments and Agencies, Granting Councils, Universities and Industry, Canada is positioned to address many of the core programme themes and related focal areas of the seventh phase of the IHP (2008-2013). Areas of proposed contribution are identified by an \*:

#### Theme 1 Adapting to the Impacts of Global Changes on River Basins and Aquifer Systems

- \*1.1 Global changes and feedback mechanisms of hydrological processes in stressed systems
- \*1.2 Climate change impacts on the hydrological cycle, and consequent impact on water resources
- \*1.3 Hydro-hazards, hydrological extremes and water-related disasters
- \*1.4 Managing groundwater systems’ response to global changes
- \*1.5 Global change and climate variability in arid and semi-arid regions

#### Theme 2 Strengthening Water Governance for Sustainability

- 2.1 Cultural, societal and scientific responses to the crises in water governance
- \*2.2 Capacity development for improved governance; enhanced legislation for wise stewardship of water resources
- 2.3 Governance strategies that enhance affordability and assure financing
- \*2.4 Water as a shared responsibility: managing water across geographical and social boundaries
- \*2.5 Resolving the water and energy nexus

#### Theme 3 Eco-hydrology for Sustainability

- \*3.1 Ecological measures to protect and remediate catchments process
- \*3.2 Improving ecosystem quality and services by combining structural solutions with ecological biotechnologies
- \*3.3 Risk-based environmental management and accounting
- \*3.4 Groundwater dependent ecosystems identification, inventory and assessment

#### Theme 4 Water and Life Support Systems

- \*4.1 Protecting water quality for sustainable livelihoods and poverty alleviation
- \*4.2 Augmenting scarce water resources

\*4.3 Achieving sustainable urban water management

\*4.4 Achieving sustainable rural water management

#### Theme 5 Water Education for Sustainability Development

5.1 Tertiary water education and professional development

5.2 Vocational education and training of water technicians

\*5.3 Water education in schools

\*5.4 Water education for communities, stakeholders and mass-media professionals

Prepared by:

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Water Science and Technology Directorate

Environment Canada

Canadian Delegation to IHP

on behalf of the Canadian National Committee