

FLOW MONITOR

CANADIAN WATER POLICY WATCH

VOLUME 3 - FALL 2010



Message from the Co-Chairs

In this edition of the *FLOW Monitor*, we highlight the need for greater transparency in the public policy process, including the development of comprehensive science and monitoring programs, an increase in publicly accessible information, and a more open dialogue between governments and citizens. The feature articles in this issue illustrate situations in which improved transparency and accountability would strengthen water governance and improve fresh water protection, including:

- Independent scientific research and comprehensive monitoring as a foundation for effective water management in Alberta's oil sands;
- Accountable and transparent regulatory bodies to lead Canada's environmental assessment processes; and
- Science-based, publicly accountable organizations, such as the International Joint Commission to oversee transboundary agreements, including the Great Lakes Water Quality Agreement.

Yours for improving Canada's action on water,
Norman Brandson and Robert W. Sandford

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To learn more about actions FLOW believes the Federal government should take to address topics covered in each article, this icon directs readers to relevant sections in *Changing the Flow*.

OIL, WATER, SCIENCE AND DEMOCRACY



By Tony Maas and Jim Bruce

On June 17, after 18 months of intermittent hearings, testimony and meetings, Parliament's Standing Committee on Environment and Sustainable Development (ENVI) abruptly ended its investigation into the impacts of oil sands development on water and its members agreed not to publish the draft report. Since the final committee meeting on this issue was held in camera, the public may never know the details of how and why this decision was made. As two of the 58 individuals who invested significant time and effort in this process by providing testimony to the committee, we find it both troubling and discouraging that the committee members were unable to hold up their end of the bargain and report their findings to Canadians.



LINKING BACK TO CHANGING THE FLOW...

Priority 2: Responding to the Impacts of Climate Change and Energy Production

Priority 7: Develop World Class Science

In fact, the inaction is a slight on democratic process, and it is likely to further forestall any serious action on the part of the federal government to protect freshwater resources and ecosystems in the oil sands region. It also suggests growing tensions among Canada's political parties regarding the appropriate scale and pace of oil sands development and on the federal government's role in monitoring and regulating the related impacts.

The federal government has constitutional and fiduciary responsibilities related to regulating and addressing the impacts of oil sands development on freshwater resources and ecosystems. Protection of inland fisheries and aquatic habitat, the rights of Aboriginal peoples, pollution prevention and resolution of inter-provincial/territorial disputes over shared waters all fall within the purview of the federal government.

Effectively delivering on these responsibilities depends significantly on sound knowledge and information, and on the scientific research and monitoring programs required to generate it; yet there is an ongoing erosion of capacity for and investment in water science and monitoring in Canada. At one time, Canadian government scientists were among world leaders in water resource science and monitoring. The Canadian Experimental Lakes Area program, for instance, was internationally praised as one of the most successful stories in environmental science and policy when it proved that eutrophication could be controlled by reducing phosphorus inputs. As a result, phosphorus controls were enacted in many countries, including Canada. Lake Erie and Lake Ontario began to recover from regular nuisance blue-green algae blooms in just a few years. Today, a lack of applied, policy-oriented research and long-term monitoring significantly undermine the effectiveness of water governance and the transparency of decisions regarding freshwater resources.



Photos courtesy of David Dodge, CPAWS (oilsandswatch.org)

While the Committee's report will never see the light of day¹, the 300 pages of testimony provided by representatives of industry, governments, First Nations, academics and NGOs are available and accessible to the public. Of the many concerns raised and recommendations proposed in those pages, many reiterate the need for sound science, new knowledge and robust monitoring systems as the foundations of transparency in water governance. In the case of the oil sands, it appears we are operating largely in the absence of all three.

Despite a 2003 study that found that oil sand pollutants can be toxic to fish in the Athabasca River, Environment Canada staff members testified that they have not conducted any additional in-field studies looking at fish toxicity. Reports by the Alberta Research Council and the Council of Canadian Academies conclude that in situ oil sands projects as well as disturbances to shallow groundwater in oil sands surface mining have proceeded without adequate understanding of the groundwater regime in the area. Several witnesses indicated that mining projects requiring water withdrawals from the river were approved in the absence of a sound assessment of the cumulative impacts on river flows and fish habitat, and without taking into account that river flows have declined and are likely to further decrease under climate change. Downstream impacts in the Mackenzie River system were not seriously considered.

Dr. David Schindler, an internationally respected water ecologist, noted that monitoring activities in the Athabasca River that were once conducted by

the federal government have been transferred to the Alberta government, which has since turned much of this activity over to industry. More specifically, Schindler, citing a federal review of the Regional Aquatic Monitoring Program (RAMP)—the industry funded multi-stakeholder group that monitors pollution in the river—testified that RAMP repeatedly changed the pollutants it studied and where and how it sampled them, "...all the things that violate the first principles of monitoring programs."

Schindler's work also showed that atmospheric pollutants from oil sands operations are transported downwind, deposited onto snow and vegetation, and contribute to contaminated runoff to downstream waters.

In short, an excellent opportunity to increase transparency on the environmental aspects of oil sands development has been squandered. A forthright report from Parliament could have led to improvements in environmental monitoring and management in the important headwaters of the vast Mackenzie River Basin. Abandoning the report simply feeds suspicions in Canada and internationally that there is much to hide about the environmental impacts of Alberta's oil sands development. **F**

¹ After failing to reach consensus, the Liberal Water Caucus released their own report, titled *Hidden Dimension: Water and the Oil Sands* on August 18, 2010. The NDP and the Conservative Party have announced intentions to also release their own reports. There is no obligation for the government to respond to recommendations in these reports.

A PLEA FOR A NATIONAL DIALOGUE ON ENVIRONMENTAL OVERSIGHT

“Canada’s environmental performance is, by most measures, the worst in the developed world. We’ve got big problems”

(PRIME MINISTER STEPHEN HARPER, YEAR-END TELEVISION INTERVIEW ON CTV, DECEMBER 23, 2006).

By Ralph Pentland and Merrell-Ann Phare

The federal government’s 2010 budget included several proposed changes to the federal environmental assessment process. One of the most controversial proposals was to transfer responsibility for conducting comprehensive environmental assessment studies of large energy projects from the Canadian Environmental Assessment Agency (CEAA) to the National Energy Board (NEB) and the Canadian Nuclear Safety Commission (CNSC). Federal Environment Minister Jim Prentice stated that the purpose of shifting control was to “simplify and streamline” the process and that “the fundamentals of environmental assessment are not changing.” However, the newly increased ministerial discretion could weaken public participation and reduce transparency if decision-making powers are removed from the CEAA, which has a mandate that is clearly distinct from

regulatory bodies directly associated with the energy industry. Critics of this transfer of powers fear the close relationship between industry and the NEB and CNSC may result in decisions that favour development over environmental protection.

Further, this is not a positive move with respect to government responsibilities toward Aboriginal peoples, if recent court decisions are any indication. The 2009 *Brokenhead vs. Canada* decision of the Federal Court indicated that the NEB process would likely be inadequate in addressing the impacts of large energy projects on the rights and title of First Nations peoples. It is likely that First Nations will continue to resist having the bodies charged with regulating pipelines, energy development and trade in the Canadian public interest determine how large energy projects impact their Aboriginal and treaty rights. These changes follow a twenty-year trend toward weaker environmental oversight and regulation. Along the same lines, governments have also reduced transparency by eliminating state-of-the-environment reporting, added elaborate



LINKING BACK TO
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Priority 2: Responding to the Impacts of Climate Change and Energy Production

Priority 4: Protecting Aquatic Ecosystems and Aboriginal Water Rights

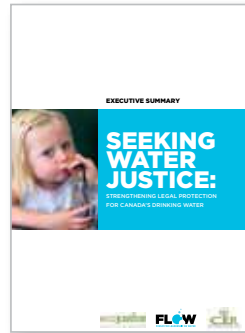
TABLE 1: CANADA RANKS NEAR THE BOTTOM OF 2010 ENVIRONMENTAL PERFORMANCE RATINGS

TITLE OF STUDY	Authors of Study	CANADIAN RANKING
How Canada Performs	Conference Board of Canada	15th out of 17 peer countries
Environmental Performance Indicator	Yale Centre for Environmental Law and Policy and Columbia University Center for International Earth Science and Information Network in collaboration with the World Economic Forum	46th out of 163 countries
The Maple Leaf in the OECD - Canada’s Environmental Performance	Authored by the School of Resource and Environmental Management, Simon Fraser University and published by the Organization for Economic Cooperation and Development (OECD)	24th out of 25 countries

analytical barriers to the adoption of new regulations, introduced self-regulation and voluntary approaches without sufficient oversight, weakened the application of the precautionary principle and adopted so-called “smart regulation.” The last of these measures aims to specifically promote the economic interests of regulated entities. According to several international comparisons (see Table 1), the net effect of these and other changes has been to lower Canada’s environmental performance to the bottom of the pack among industrialized nations. Such environmental oversight could result in significant environmental degradation and negative human health effects. Recent studies linking environmental regulation, productivity and competitiveness also suggest that weak environmental regulation could seriously impair our national economy (for example, see *The Porter Hypothesis at 20: Can Environmental Regulation Enhance Innovation and Competitiveness?*, Chair’s Paper, Porter at 20 Conference, McGill University, June 27-28, 2010).

Prime Minister Stephen Harper and Minister Prentice are faced with a tough decision when Parliament resumes—one that will indicate to the Canadian public whether their initial assertions about the veracity of the environmental assessment are true. A federal review panel recently concluded that the proposed Prosperity copper-gold mine in British Columbia would have a number of “significant adverse environmental effects” including on fish, fish habitat, grizzly bears, and First Nations’ traditional use of lands. Mr. Harper and Mr. Prentice will decide whether this matters in the face of Prosperity’s projected \$5-billion economic injection into the province. What happens with this environmental assessment will be a test of the federal government’s true commitment to environmental assessment and its use to avoid the negative impacts of unfettered resource extraction.

We know from public opinion polls that Canadians consider water to be their most important resource and are deeply concerned about the health of our rivers and lakes. We believe that if Canadians were presented with all the facts and had an opportunity to participate in an open, transparent and honest debate, they would insist on an environmental oversight and regulatory regime vastly superior to that which prevails today. FLOW hopes that Canadians will be given the opportunity to participate in the development of long-term solutions through a broader public debate on a Canada-wide water strategy. **F**



NEW FLOW REPORT: SEEKING WATER JUSTICE

In May 2010, FLOW released a new report, *Seeking Water Justice: Strengthening Legal Protection for Canada's Drinking Water*. Co-authored by Ecojustice and the Centre

for Indigenous Environment Resources, the report revealed that ten years after the Walkerton tragedy certain communities in Canada—specifically rural and First Nations—remain vulnerable to drinking water contamination. Risks are attributed to inadequate infrastructure, patchwork provincial laws, and a lack of binding drinking water standards from the federal government. The report calls for world-class, enforceable drinking water standards that are consistent across Canada, resources for First Nations drinking water services and transparent reporting on the state of drinking water systems across the country. Download the report at www.flowcanada.org/library/documents.

In its first project, FLOW will work on scoping potential elements of a First Nations Water Commission—a potentially critical tool in building First Nations’ capacity to manage water on their lands and become more involved in national water management discussions and decision-making. Second, FLOW will convene a water expert forum on an

FLOW UNDERTAKES CHALLENGING NEW PROJECTS

issue-by-issue basis to solve specific intractable water problems in Canada. The first forum will be held in the Northwest Territories to enable local water managers to

access world-class knowledge to implement their water strategy, while sharing their innovative approach to consultation and traditional knowledge with other Canadian jurisdictions. These projects were made possible with funding from the RBC Blue Water Project.



AN UPDATE: RENEGOTIATION OF THE GREAT LAKES WATER QUALITY AGREEMENT

By Jim Bruce and Marc Hudon

As reported in the *Winter 2010 FLOW Monitor*, we are in the midst of an important opportunity to enhance transparent decision-making and the health of the Great Lakes and St. Lawrence River ecosystem through a number of major water governance initiatives currently under review, primarily the bilateral Great Lakes Water Quality Agreement (GLWQA).

These reviews present an opportunity to link Great Lakes actions more closely with those under the Canada-Ontario Agreement and the St. Lawrence River Plan. Jurisdictions should try to coordinate the goals and objectives of these management plans to ensure a consistent, integrated approach.

Have we taken advantage of this unique opportunity? Evidence presented below

suggests there are significant gaps in the current governance framework and a lack of transparency in the renegotiation and development processes, which prevent policy in the Great Lakes-St. Lawrence River region from adequately addressing current and emerging threats.

The necessity for the review of the GLWQA is undeniable. Following a period of improvement in Great Lakes water quality in the 1970s and 1980s under the first GLWQA, and its 1978 amendment, there have been disturbing signs of backsliding since the early 1990s. In all of the lakes, except for Lake Superior, the near shore waters are once again experiencing nuisance algal growth and related pollution issues. Renewed oxygen depletion is occurring in the summer and early autumn in the bottom waters in Lake Erie, resulting in more frequent fish kills. Forty of the 43 Areas of Concern—locations identified as geographic areas of concentrated pollution—have yet to be fully

cleaned up, over 30 years later. Toxic chemicals from emissions to the atmosphere in the basin remain at high levels, except for a few contaminants such as PCBs, DDT and select pesticides. Canadian sources of emissions are a significant factor, including known carcinogens such as mercury. These air pollutants are deposited into the lakes, contaminating the water and bottom layers of sediment.

In the 1970s and 1980s, the main sources of pollution were minimally treated municipal and industrial wastes, and excessive phosphorus in detergents. Collaborations between governments and industry have been effective at addressing many of these problems.

Unlike past threats, current and future threats to the Great Lakes are more difficult to tackle. The main sources of pollution today are more diffuse and exacerbated by climate change. More frequent heavy rain events increase contaminated runoff from farmlands and overtaxed storm sewers in urban areas. As the climate warms, loss of ice cover and warmer waters are changing lake ecosystems, leading to longer periods of anoxic conditions (dead zones) in the bottom waters. Addressing these problems will require renewed efforts to reduce non-point source pollution, including airborne contaminants.

Other Great Lakes problems are not new, but persistent. The legacies of toxic polluted sediments as well as invasive species need sustained attention and management. Beach clean-ups have only



LINKING BACK TO CHANGING THE FLOW...

Priority 4: Protecting Aquatic Ecosystems and Aboriginal Water Rights

Priority 6: Preventing Interjurisdictional Conflicts and Bulk Water Exports

Photo courtesy
of Insight Imaging:
John A Ryan
Photography.

achieved moderate success. In 2007, of the 1,500 beaches surveyed in the Great Lakes, only two-thirds were considered suitable for swimming 95 per cent of the time.

These types of problems make the development of an effective GLWQA both necessary and challenging. Several areas of contention are emerging during the renegotiation process. The first one relates to governance and the role of the International Joint Commission (IJC). In 1987, a Protocol to the original Agreement was adopted by Canada and the United States, which permitted the redefinition of the governance structure that coordinates federal, provincial and state programs. A Binational Executive Committee was established, creating a direct binational process in place of the activities previously undertaken by the IJC. As a result, the IJC's ability to scientifically assess and publicly report on progress was compromised, reducing transparency. FLOW firmly believes that the IJC's position and scientific capacities need to be restored to promote transparent decision-making in the Great Lakes region and keep citizens well-informed.

A second debate has developed around the extent and manner to which the St. Lawrence River, beyond its international section, is included in the GLWQA. Some believe that the GLWQA is an international treaty agreement and should not include purely domestic waters, while others argue that the St. Lawrence River, as a penultimate receiver of Great Lakes waters, must be included to undertake an ecosystem-based approach. Lake Michigan, after all, has been included in the GLWQA since 1987 despite being completely within U.S. borders.

Incorporation of human health issues in the GLWQA is a third issue under debate. There are signs that pollution may be affecting gender balance at birth, infant mortality, and incidence of disease. Public interest groups are urging greater monitoring of the distribution of adverse health outcomes to better target pollution control measures. Such an approach would be consistent with the Boundary Waters Treaty Article IV that states that "boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other."

This year represents a unique opportunity to protect the Great Lakes and St. Lawrence River region for future generations. Recommitting Canadian institutions to the Great Lakes cleanup is critical in face of the Obama administration's US\$475 million per year Great Lakes Restoration Program and the U.S. Great Lakes Regional Collaborative. For Canada to take advantage of these innovative programs and initiatives, our governments must find additional commitments to bring to the bargaining table. **F**



WORTH EVERY PENNY: A PRIMER ON CONSERVATION-ORIENTED WATER PRICING

FLOW's partners at the POLIS Project on Ecological Governance recently released a conservation-oriented pricing primer entitled *Worth Every Penny: A Primer on Conservation-Oriented Water Pricing*. The primer provides practical economic and technical information about how to implement conservation-oriented water pricing—starting with setting water rates sufficiently high enough to encourage conservation. Using examples from Canada and beyond, the primer explains how communities have reduced water demand and improved the environmental performance of water utilities without negative impacts on low-income families. Download the primer at www.poliswaterproject.org.

COUNCIL OF THE FEDERATION ANNOUNCES WATER CHARTER

On August 6, 2010 the Council of the Federation endorsed a Water Charter recognizing the collective obligation of Canadians and governments to be responsible water stewards. The Council is comprised of Canada's Premiers and was created in 2003 to increase collaboration on intergovernmental relations. The Council's interest in water represents an important opportunity to address critical issues such as establishing transboundary agreements that protect downstream jurisdictions from impacts on water quality and quantity. FLOW anticipates that the Water Charter will facilitate improved leadership on water, bringing provincial and federal governments together to work toward a national strategy that protects Canada's most important resource.

FLOW PARTICIPATES IN 'CREATING A BLUE DIALOGUE' WEBINAR SERIES

This fall, FLOW members will be participating in a five-part webinar series hosted by the POLIS Project on Ecological Governance called *Creating a Blue Dialogue: Canadian Water Governance into the 21st Century*. The webinars will focus on emerging water governance ideas and trends that are surfacing across the country and aim to create a continued dialogue to strategically address evolving concepts that will allow Canadians to sustainably manage water resources. The series is in partnership with the Canadian Water Network, Living Water Policy Project, Walter and Duncan Gordon Foundation, Water Canada, and Social Sciences and Humanities Research Council. For more information, visit www.waterpolicy.ca/webinar.



THE SIXTH GREAT LAKE



LINKING BACK TO CHANGING THE FLOW...

Priority 4: Protecting Aquatic Ecosystems and Aboriginal Water Rights

Priority 6: Preventing Interjurisdictional Conflicts and Bulk Water Exports

By Norman Brandson

As Canada faces the challenge of renegotiating the Great Lakes Water Quality Agreement (GLWQA), a word should be said about the “Sixth Great Lake”—Lake Winnipeg. While much attention has been appropriately focused on the five eastern Great Lakes, the fact that the tenth largest freshwater body in the world is in roughly the same condition as Lake Erie in the late 1960s seems to lack comparable interest.

With the end of the 2010 open water season, many perceive that the massive algal blooms on Lake Winnipeg, caused by nutrient enrichment largely originating from agricultural and municipal sources, have been the worst ever. For the first time, the Manitoba government had to issue public health warnings about the toxic effects of blue-green algae that clogged many of the lake’s recreational beaches.


A November 2005 report¹, commissioned by the governments of Canada and Manitoba, was tasked with identifying solutions to restore the health of the lake. As we approach the fifth anniversary of that report, it is worth reviewing a summary of its recommendations²:

- > The two governments enter into a renewable five year, \$40 million federal-provincial agreement directed at research, cleanup, public involvement, integration, planning and progress reporting (a draft agreement was appended);
- > Manitoba and Canada technical staff resolve, or agree on a process to resolve the issue of the relative importance of nitrogen and phosphorous in the eutrophication of Lake Winnipeg;
- > A Healthy Lake Winnipeg Charter be developed through a process involving all the major stakeholders throughout the basin in Canada and the United States as a basis for institutionalizing an integrated whole-basin approach to restoring the lake (a draft charter was appended); and
- > The two governments take the lead in developing this trans-basin integrating mechanism, working with the International Joint Commission, the Prairie Provinces Water Board, the provinces, states and principal stakeholders.

Photo courtesy of
Len Wassenaar,
Environment Canada.

Above all, the report urged extreme urgency in dealing with the problems plaguing Lake Winnipeg. Five years after receiving this advice, that sense of urgency is still missing, and none of the recommendations in the report have been fully implemented. Some have not been addressed at all.

Lake Winnipeg has not received the same attention as the eastern Great Lakes for several reasons, including that it is not a "boundary water" as defined under the Boundary Waters Treaty of 1909, although the transboundary Red River contributes more than half of the nutrients entering the lake.

However, the federal and Manitoba governments have taken some action. Several millions of dollars in funding have been announced several times, including a September 2010 announcement for \$875,479 in federal funding for community clean-up projects. Although, this still falls well short of the \$40 million recommended five years ago. Research funding and activity has increased sharply and some tentative steps have been taken to reduce future nutrient inputs, but not fast enough. Climate change is warming the lake and also appears to be responsible for increased precipitation between spring and fall—both factors will likely to accelerate eutrophication. Our federal government has identified water as a priority issue. Both the strengthening of the GLWQA and the promotion of Lake Winnipeg into the ranks of our other five Great Lakes should be actions that give life to that priority. 

¹ *Restoring the Health of Lake Winnipeg*—a report by the Lake Winnipeg Implementation Committee

² The report presented 22 recommendations. The above summary (except for the nitrogen-phosphorous recommendation) touches only on the broad thematic advice.

BILL S-11: SAFER DRINKING WATER FOR FIRST NATIONS?

By Nancy Goucher and Merrell-Ann Phare

On May 26, 2010, the federal government introduced Bill S-11, titled the "Safe Drinking Water for First Nations Act" into the Senate. FLOW welcomes the intent of the proposed bill to improve the health and safety of First Nations through the development of a federal legal regime that governs drinking water and wastewater treatment in First Nations communities. However, parliamentarians should be conscious of the bill's potential to undermine aboriginal and treaty rights without significantly improving access to safe drinking water.

Improved access to safe drinking water is urgently needed in many First Nations communities. In 2009, there were 48 communities whose systems remain classified as high risk. As of July 31, 2010, there were 116 First Nations communities under drinking water advisories—a number that has remained relatively constant for a number of years, despite Canada's attempts to better manage access to safe drinking water in these areas.

The Government asserts that Bill S-11 is the answer to the problem despite applying an approach contradictory to two of the government's key reports including the 2005 Annual Report of the Commissioner of the Environment and Sustainable Development to the House of Commons, and the 2006 Expert Panel on Safe Drinking Water for First Nations Report.

First, Bill S-11 proposes to regulate drinking water on reserves according to provincial standards, contrary to the recommendations of its own Expert Panel. The proposed regulations fail to address the inconsistencies and gaps that exist in provincial drinking water regulations and instead perpetuate these known and well-documented inadequacies.

Second, the new bill does not consider how First Nations will meet the proposed regulations. The Environment Commissioner and Expert Panel both highlight the necessity of establishing capacity-building mechanisms such as a First Nations Water Commission, a First Nations Water Tribunal, and fair funding arrangements. Without first addressing the financial requirements to properly implement the proposed bill, Canada is creating expectations and liabilities for both itself and First Nations. This is not a fiscally prudent approach, and, in fact, is likely to exacerbate the problem.

Most worrisome is that Bill S-11 may impact aboriginal and treaty rights. Section 6 states that Bill S-11 and its regulations will "prevail over the land claims agreements or self-government agreements." Section 4.1(r) acknowledges that Aboriginal and treaty rights may be affected. Canada, however, has not consulted First Nations to determine the extent of those impacts and accommodate concerns in advance. To enact legislation which appears to contemplate and even condone impacts on First Nation's rights without first accommodating the known concerns of First Nations is in direct violation of the government's fiduciary duties and responsibilities, not to mention the statements of the Supreme Court of Canada regarding the protections afforded First Nations rights by virtue of Section 35(1) of the Canadian Constitution.

FLOW strongly urges the Senate to consider and address these issues before the bill is debated in the House of Commons. We are legally and morally bound to ensure First Nations have access to safe drinking water without compromising their inherent and constitutional rights.

THE COLUMBIA ICEFIELD RESEARCH PROJECT

By Robert W. Sandford

Ground-breaking glacial and hydrological research is being undertaken in Canada's western mountain national parks. In association with Parks Canada and the Canadian Rockies Snow and Ice Initiative, the Glaciology Section of the Geological Survey of Canada is working on the Columbia Icefield Research Initiative. This study, led by Dr. Mike Demuth, will provide the first complete analysis of the volume of ice contained within the Columbia Icefield. The results of this multi-year research project will help decision-makers determine how much water supply will be available in an increasingly populated West under the broadest range of possible climate change scenarios.

The biggest challenge to properly assessing how much water is stored in the Cordillera region glaciers is calculating the volume of its glaciers. Unlike surface area, measuring a glacier's exact volume is difficult due to the unknown character of the topography beneath the ice. Since there is no simple and inexpensive way to do this, the state and fate of many of Canada's remaining glaciers are rough estimates based only on the best available topographic information.

Instead of calculating the volume of the 223 km² Columbia Icefield system as a function of area (as it


has been in the past), Dr. Demuth and his team will determine the exact volume of ice by using ground penetrating radar surveys in combination with a remote sensing technology called LiDAR (Light Detection and Radar). Similar to its sister technology, RaDAR (Radio Detection and Ranging), LiDAR uses near-infrared pulses emitted by a laser from an aircraft flying over the area. This laser energy interacts with surface features and once they scatter, the light energy returns to a detector to provide a simple "time of flight" measurement. The position of the aircraft is tracked using Global Positioning System (GPS) technology.



The Athabasca Glacier is the best known outflow of the Columbia Icefield. Parks Canada estimates that 2 million visitors a year are attracted to Jasper National Park to experience the most accessible major glacial mass in Canada. Photo courtesy of Alaskan Dude

Careful analysis of the data yields an illuminated footprint of the landscape over which the detection of features and their exact relative distance from one another has been put into relief. The combination of LiDAR and ground-penetrating RaDAR should produce the first truly accurate measurement of the form and thickness of the Columbia Icefield. Once the total amount of ice is known, we can determine its water equivalent. These calculations will enable more accurate estimates of how long individual glaciers and the Columbia Icefield itself will continue to exist under various projected climate change scenarios.

Given the central position of the Columbia Icefield at the headwaters of three of the country's most important river systems—the Athabasca, North Saskatchewan and Columbia Rivers—the Columbia Icefield Research Initiative will generate research outcomes that will be of great value in determining how much water will be available in the West in the future.

The Columbia Icefield Research Initiative may well be the most important scientific research project undertaken in a Canadian national park since the national park system was created 125 years ago. A great deal of ice in the West is melting. By refining our understanding of the state and fate of the glacier ice that shapes the hydrology of Western Canada, we will have better knowledge about the hydrological limits of the dry West and the future carrying capacity of the landscape. After all, the depletion of oil and gas reserves will not be the ultimate constraint to development on the Great Plains of Canada; it will be a limited water supply. 



LINKING BACK TO *CHANGING THE FLOW...*

Priority 2: Responding to the Impacts of Climate Change and Energy Production

Priority 7: Develop World Class Science



The Columbia Icefield as modelled by The Geological Survey of Canada
Courtesy of Natural Resources Canada

FLOW MEMBERS

The Forum for Leadership on Water (FLOW) is an independent group of water experts from across Canada that encourages government action to protect and steward our critical freshwater resources. We are committed to proposing policy solutions, urging action and tracking progress towards a more sustainable water future.

We believe that all levels of government and broader civil society must work together as part of a Canada-wide strategy that effectively addresses current and emerging threats to freshwater security.

To receive future editions of the FLOW Monitor, visit www.flowcanada.org.

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Jim is the Canadian Policy Representative for the Soil and Water Conservation Society and a consultant on climate change adaptation, water management and natural disaster mitigation. He has been Director of the Canada Centre for Inland Waters as well as the Assistant Deputy Minister for Environmental Management and Atmospheric Environment. www.swcs.org

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Tony Maas, WWF-Canada

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Robert Sandford, United Nations International "Water for Life" Decade

Bob Sandford is the Canadian Chair of the United Nations International Decade "Water for Life" Decade, a national partnership initiative that aims to advance long-term water quality and availability issues in response to climate change in this country and abroad. Bob is also the Director of the Western Watersheds Climate Research Collaborative.

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Thank you to the Walter and Duncan Gordon Foundation and the RBC Blue Water Project for their support.