

PROCEEDINGS



3rd edition
International Forum
on Integrated Water Management
Tools for ACTION

Transboundary Waters Management in a Context of Climate Change

May 7-9, 2014
Université Laval
Québec City, Québec
Canada

Organized by



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MESSAGE OF THE PARTNERS

We are very pleased to have had the opportunity to participate in the 3rd edition of the International Forum on Integrated Water Management to promote knowledge advancement and sharing on one of the main challenges of the 21st century: integrated water management in transboundary contexts.

One of the major mandates assigned to municipalities is to ensure an adequate supply of good-quality drinking water. The quality of life of the citizens and their health largely depend on this crucial factor. Water quality and availability also impacts the appeal and economic development of the territory.

In Quebec and the rest of Canada, the abundance of water has long made us believe that it is an infinite resource and integrated water management has now become urgent to tackle pressing challenges for municipalities and scientific communities. Like everywhere else in the world, we are facing scientific and societal challenges in water management, and the current backdrop of climate change has heightened the urgency for collaboration to find solutions that are sustainable.

These solutions start with the training of professionals to encourage new thinking in water management. To this end, the 3rd International Forum on Integrated Water Management was an opportunity for environmental and water engineering students at the *Université Laval* to broaden their knowledge and meet international scientists and researchers. The large number of municipal professionals in attendance also benefited from the event.

This gathering also highlighted the importance of research in the development of solutions to overcome the challenges of water management. Scientific and technical innovation is key in this process. Innovation however, requires refined knowledge of the phenomena at play and the ability to anticipate changes over time. This is where research steps in. It provides a better understanding of the world and its future. Universities are pivotal in focusing, advancing and sharing strategic knowledge for social progress and the development of sustainable solutions to enable integrated water management.

We would like to thank the organizers of the 3rd edition of the International Forum on Integrated Water Management and congratulate all those who contributed to advance knowledge on water management at the event. Their presentations are summarized in this document. The Quebec Metropolitan Community territory and the *Université Laval* campus extend their thanks and welcome to the speakers to further their work on integrated water management.



A handwritten signature in blue ink, appearing to read 'Régis Labeaume'.

Régis Labeaume

Quebec Metropolitan Community
President

Mayor of Quebec City



A handwritten signature in blue ink, appearing to read 'Denis Brière'.

Denis Brière

Université Laval Rector

MESSAGE OF THE ORGANIZING COMMITTEE

With the adoption of the National Water Policy by the Québec Government in 2002, water management became structured around an integrated and concerted watershed-based approach. In 2009, several watershed organizations were created to complete this mission for the southern region of Québec. The *Regroupement des organismes de bassins versants du Québec* (ROBVQ) was already holding meetings with all the watershed organizations, and the *Conseil de gouvernance de l'eau des bassins versants de la rivière Saint-François* (COGESAF) advised reaching out to the international community. This led to the International Forum on Integrated Water Management – Tools for Action.

The 3rd International Forum on Integrated Water Management was held May 7-9, 2014. It was jointly organized by the North American Network of Basin Organizations (NANBO), ROBVQ and COGESAF in collaboration with the Quebec Metropolitan Community and *Université Laval*. The theme of this third edition was **the challenges of transboundary water management in the context of climate change**.

The objectives of the International Forum still focused on developing international partnerships, strengthening information and experience exchange mechanisms and learning about integrated water-management structures and governance tools used around the world. Selected sub-topics (please refer to the Background section of the International Forum) had to be well-grounded and cover governance, planning, consultation, identification and assessment tools required to meet the needs of a wide variety of stakeholders. The International Forum targeted watershed organizations, elected and municipal officials, business and government professionals, students and researchers, community organizations, farmers, foresters, shoreline residents and citizens.

The organizers of the 3rd International Forum would like to thank the 71 speakers (including top-level politicians and internationally acclaimed [keynote speakers](#)), the +300 participants (all in all 12 countries and 7 Canadian provinces were represented) and the event's 15 sponsors and exhibitors. Their collective participation contributed in making this edition a huge success. These International Forum Proceedings aim at maintaining the momentum and are dedicated to all of the above.



Jean-Paul Raïche



Normand Cazalais



Marie-Claude Leclerc

BACKGROUND – THE 3RD INTERNATIONAL FORUM OF INTEGRATED WATER FORUM MANAGEMENT

Following the first two successful editions, the organizers of the International Forum on Integrated Water Management–Tools for Action chose to structure the 3rd edition around the theme: Challenges of transboundary water management in the context of climate change.

Transboundary water management dates back a long way: it was the underlying reason behind the first international agreement signed by two Sumerian city-states around 2500 BC. It is also a priority nowadays. Today, about 40% of the world population live a watershed shared by at least two countries. There are 276 such watersheds worldwide and these vast areas span over nearly half of the total land surface, accounting for 60% of the total piped-in water supply. In addition to these watersheds, there are more than 300 international aquifers that cater for nearly 2 billion people.

Surface and underground transboundary waters are undeniably an important natural resource socially, economically and environmentally. Fundamentally, people and governments are aware that collaboration for integrated transboundary water management is not only vital but also highly beneficial. In 2008 however, the World Water Council found that 158 transboundary basins had no international management framework. This shortcoming is even more striking if we broaden the definition of boundary to everything that separates two distinct territories, and include intra-national bodies (e.g. provinces, federated states, municipalities).

With climate change impacting the quantity and quality of water available, it is all the more urgent to take action. Water stress will have repercussions on supply, the security of communities and on ecosystems that support our lifestyle and wellbeing.

We need to continue to work towards alleviating the repercussions of climate change. Better integrated transboundary water management is the preferred solution to strengthen our adaptive and resilience capacity as a group in the context of these changes. Mankind as a whole will benefit from these efforts since water and waterways connect all populations.

The theme of the 3rd International Forum was highly relevant to Québec stakeholders involved in water management. The 2002 National Water Policy and the *Act to affirm the collective nature of water resources and provide for increased water resource protection* adopted in 2009 allowed the implementation of watershed-based integrated management. Significant progress was also made in terms of horizontal integration, i.e. collaboration between stakeholders of different sectors, and vertical integration, i.e. collaboration between stakeholders from different levels. Territorial integration, i.e. the ability to work beyond administrative boundaries, has also improved in the province. Interesting examples of transboundary collaboration exist but are often confined to the St. Lawrence River. Apart from a few well-documented examples detailed in the 3rd International Forum (namely Lake Champlain, Lake Memphremagog, etc.), the stakeholders involved in the management of basins shared by Quebec with other Canadian provinces or US States can further improve their collaboration.

The aim of the 3rd International Forum on Integrated Water Management was to help strengthen our collective capacity to manage transboundary water resources and its related ecosystems in a participatory and inclusive way.

To this end, the schedule of the event was structured around the following:

- *Governance and institutional capacity building tools;*
- *Tools for managing water resources and their uses;*
- *Risk management and climate adaption tools;*
- *Integrated water management case studies: Great Lakes/St. Lawrence River basin, the Rhine-Meuse system, and the Rio Grande/Río Bravo watershed.*

The [program committee](#) ensured that presentations made at the International Forum promote practical approaches and the necessary tools for action. The presentation on intra-national and North-American collaborative transboundary initiatives was another highlight.

The website of the International Forum can be viewed at www.rv-eau.ca.

Details about the first two editions are also available.

The list of people who participated in the 3rd edition of the International Forum on Integrated Water Management and their contact details are available [here](http://rv-eau.ca/Liste_Participants_3e.pdf) (http://rv-eau.ca/Liste_Participants_3e.pdf).



MANAGEMENT OF THE GREAT LAKES AND THE ST. LAWRENCE – TIME TO ACT TOGETHER

Normand Cazalais, Executive Director of the North American Network of Basin Organizations (NANBO)

This text notably refers to the discussions that took place during the inaugural roundtable entitled Great Lakes and St Lawrence management: assessment, expectations and collaborations.

The Great Lakes & St. Lawrence water system represents 20% of the planet's fresh water resources. It supplies drinking water to some 40 million people living in one of the most economically developed regions in the world. This huge watershed spreads out over both Canadian and US land. It is jointly managed by eight American States and six Canadian Provinces.

The Great Lakes/St. Lawrence watershed covers a large area in North America. This water system has shaped the exploration, occupation and organization of the very beginnings of the New World. Despite its vital importance and the transboundary collaborations that have been built over the years, the management of this water system is less discussed in international conferences than that of other sizeable rivers.

The 3rd International Forum on Integrated Water Management was held in 2014 to build greater awareness on the management done by public institutions at the local, regional and international levels. This management is very complex as it involves issues related to trade, transport, land use, the environment and political organizations. Furthermore, climate change is bringing about new and significant challenges. As a result of which, many management parameters need to be reviewed and adapted.

The International Forum welcomed participants from various sectors namely government, business and science. The objective was to highlight the conditions and procedures of current partnerships/collaborations and identify new opportunities in the context of climate change.

On the first day, there was a roundtable to review this management process and the related collaborations and expectations. The Honorable Benoît Bouchard, Canadian Commissioner to the International Joint Commission (IJC) outlined the main mandates of this Canadian-American organization dedicated to the cooperative management of the shared waters. Régis Labeaume, Mayor of Québec City and President of the Québec Metropolitan Community explained the strategic position of his city within the Great Lakes/St. Lawrence system and the mechanisms that have been set up to better manage water resources. Paul A. Dyster, Mayor of Niagara Falls in the State of New York and a board member of the Great Lakes–St. Lawrence Cities Initiative and David Naftzger, Executive Director of the Council of Great Lakes Governors based in Chicago, Illinois presented the mandates, objectives and initiatives of their respective organizations.

Below are some main points from the presentations:

- The special features of the physical geography of the Great Lakes/St. Lawrence system deeply embedded within the North American continent and ensuing water dynamics;
- The stark contrast between densely populated, dynamic economic areas upstream Québec City and sparsely populated areas downstream;
- The strategic importance of Greater Québec City Area within the Great Lakes/St. Lawrence basin;
- The key role of IJC in controlling the flow of the St. Lawrence River, especially at the Lake Ontario outlet upstream from the Greater Montreal Area.

During the question time that followed, members of the roundtable pointed out various aspects such as:

- Special collaboration methods put into practice by their organizations;
- New expectations from various partners for better integrated water management in the context of climate change;
- Collaboration possibilities for optimal management of the Great Lakes/St. Lawrence under these circumstances;
- Urgency to establish the conditions and procedures for better connections between the local and special initiatives from basin organizations and those of major international organizations.

NANBO and its partners, namely ROBVQ and COGESAF were pleased to host the 3rd International Forum on Integrated Water Management in collaboration with the Quebec Metropolitan Community and *Université Laval*. NANBO would like to thank all the people –speakers, participants, volunteers – and supporting organizations such as sponsors and exhibitors whose contribution helped make this event a success.

The Forum was designed to drive further collaboration between all stakeholders in water resources management. In the case of the Great Lakes & St. Lawrence watershed, the time to act together is now, more than ever.



ECOSYSTEM-BASED ADAPTATION TO CLIMATE CHANGE: HOW TO DEAL WITH CHALLENGES RELATED TO TRANSBOUNDARY WATERS?

Liette Vasseur, Head of the Climate Change Adaptation group for the Commission on Ecosystem Management of the IUCN and UNESCO Chair for Community Sustainability at Brock University -

Marie-Eve Buist, Projects Manager at North American Network of Basin Organizations

In the context of the 3rd International Forum on Integrated Water Management, held on May 7-9, 2014 at *Université Laval*, Québec City (www.rv-eau.ca), one of the workshops led by Liette Vasseur presented ecosystem-based adaptation (EbA) as a tool to improve the integrated management of challenges related to transboundary waters in the age of climate change. The Secretariat of the Convention on Biological Diversity considers ecosystem-based adaptation as a strategy involving the integrated management of lands, waters and living resources which supports conservation and sustainable use in a fair manner. This approach aims at preserving a balance between the 3 aims of the Convention on Biological Diversity, namely conservation, sustainable use, and fair and equal sharing of the benefits derived from the utilization of genetic resources.

EbA addresses all the components of ecosystems including ecological and social systems in a comprehensive and integrated manner. It is an integrated and fair management approach to help conserve natural resources and biodiversity while leading communities to adapt to climate change and build their resilience ([Andrade et al. 2012](#)). EbA is thus part of the decentralization of the management of natural resources with the aim to strengthen the abilities and increase the involvement of local communities. This article presents the main findings of the workshop.

EbA calls for collaboration between the different sectors responsible for ecosystems' management and the beneficiaries of ecosystem services. Greater collaboration between the parties concerned can reduce conflicts and give rise to multi-stakeholder processes when developing adaptation policies to deal with climate change. A comparison of experiences in various regions shows that much of the progress made in terms of transboundary management can be attributed to voluntary rather than coercive efforts because of limited resources to implement EbA.

One of the problems faced by EbA is the changing course of transboundary waters. In fact, the geographic delineation of these resources is a challenge. One option would be to use transition zones or territorial ribbons where the inherent properties and social context of each transboundary watershed are taken into account.

A second challenge faced by EbA is bringing together all the stakeholders involved in integrated water management, especially when the level of information differs significantly from one individual/organization to another. Since transboundary water management often involves several issues and various stakeholders, each of them should be addressed sequentially by dealing with one issue at a time.

Finally, it is important to identify and differentiate between the short-term and long-term needs. EbA and resilience should thus be the medium and long-term goals. Priority should be given to these perspectives while providing short-term deliverables. It would be useful to work on long-term consensual goals to derive maximum benefits from EbA. One such goal would be the gradual improvement of water quality in shorter phases to encourage involvement of the parties concerned.

In the context of transboundary water management, it should be noted that EbA comes in various forms and has to take into account each region's social, ecological, economic, political, regulatory and cultural background.



THE BENEFITS OF TRANSBOUNDARY COLLABORATION FOR WATER MANAGEMENT

Jean-François Donzier, Permanent Technical Secretary of the International Network of Basin Organizations and **Antoine Verville**, Deputy Director of the *Regroupement des organismes de bassins versants du Québec* (ROBVQ)

This text notably refers to the discussions that took place during the inaugural roundtable entitled Promote the management of transboundary waters and for what benefits as well as the workshop Identification of benefits from transboundary waters cooperation.

Watersheds are natural geographic units that cross administrative boundaries and borders whether municipal, intra-national and international. Where transboundary water bodies are concerned, there are as many as 276 rivers, 156 lakes and at least 600 aquifers listed worldwide.

It is said that where there is a will, there is a way. This type of strong and sustainable political will is required today to deal with situations, often critical, related to transboundary water management.

A rapidly evolving international context

The water situation is rapidly changing on a global scale: water quality is deteriorating while aquatic systems are suffering from eutrophication and degradation. Point and non-point source pollution is on the rise.

Water is already the *first victim of climate change*. We hope that an ambitious international agreement will be reached at the COP 21 to drastically cut down the emission of greenhouses gases. However, even in such a case, results will be visible only at the turn of the next century. By then, the regimen of our rivers, lakes, wetlands and aquifers will have significantly changed. Climate change will further influence the intensity, duration and frequency of phenomena such as floods, droughts and storms.

These circumstances will cause more issues in a transboundary context where the decisions made by upstream States will impact on the quality and availability of water in downstream States as well as altering the sedimentation.

What will happen if catchment basins for the drinking water supply dry up? If dams are no longer able to generate hydroelectric electricity? If irrigation for agricultural purposes is compromised or if we are no longer able to sustain fish production and maintain waterway transport?

We need to adapt and strengthen our resilience to climate change. It is unavoidable. And more importantly, it is pressing. Transboundary collaboration for better water management is key if we want to achieve any measure of success.

The benefits of transboundary collaboration

The management of water and aquatic ecosystems should be done at the river, lake or aquifer basin and sub-basin levels to facilitate adaptation. The setting up of collaboration mechanisms between riparian states of the same transboundary basin is bound to generate benefits.

First, a common basin organization ensures formal dialogue between the states and prevents geopolitical conflicts. This dialogue translates into an efficient information flow and exchange to facilitate decision-making. This in turn lays the groundwork for the development of management plans and programs for joint initiatives with results that can be tracked using common indicators.

Aquatic ecosystems provide an ecological function which transcends barriers. Aquatic environments are an irreplaceable natural heritage, this includes the biodiversity and the **green infrastructure**. The latter play a key role in regulating floods and low flows and in fending off pollution via auto-purification processes.

Transboundary collaboration must not be limited to the traditional stakeholders in water resources management. There is a need to think out of the box to get various sectors involved. Local authorities, businesses and associations must be spurred to complement the efforts of national administrations since they are the most effective partners in driving change in the field.

Several examples of transboundary cooperation exist between Mexico and the USA, in Central America, between Peru and Bolivia, in Europe, in Africa, in the Mekong Basin and between Canada and the USA.

Since 20 years, the Great Lakes St. Lawrence River Basin Sustainable Water Resources Agreement has ensured that ten riparian states and provinces comply with a set of principles designed to protect and conserve basin waters.

The implementation of transboundary water management agreements is a hassle-free process that is facilitated by recent initiatives such as the UNECE Water Convention and the EU Water Framework Directive, the policy of the African Ministers' Council on Water (AMCOW).

The important contribution of intra-national bodies

The contribution of intra-national bodies must not be overlooked in any transboundary management. Provinces, states and territories play an important political role from within their federation since they have legislative, regulatory and fiscal control and expertise over their water resources. Several rivers cross intra-national boundaries or form part of these boundaries like the Ottawa River which defines the border between Québec and Ontario.

A lack of collaboration between intra-national authorities can be detrimental to the environment and bear socio-economic consequences. On the other hand, partnering intra-national authorities benefit from a wider choice of solutions and possibilities.

Several interesting examples were presented at the International Forum, including that of Lake Abitibi reservoir. For 50 years, the lack of communication between the stakeholders of a hydroelectric dam in Ontario and the stakeholders of water resources in Québec had adversely impacted Lake Abitibi reservoir's water level management at the provincial boundary. Only an intra-national perspective could rapidly solve the issue.

Another interesting example was the role of the Belgian regions in implementing international agreements on the Meuse and Scheldt rivers.

To conclude, integrated water management is important at all transboundary levels – municipal, intra-national and international. Past experiences have shown its effectiveness in the field.

The major obstacles are mainly institutional and financial in nature rather than technical. Best practices should be identified and shared by drawing on expertise and through experience-exchange platforms and training. Nothing can be achieved without the strong political will of all the governments concerned. We must act now to win this battle for water and build a future for the coming generations.



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THE NORTH AMERICAN YOUTH GATHERING FOR WATER: MOBILIZATION OF THE YOUTH FOR BETTER SUSTAINABLE WATER MANAGEMENT

International Secretariat for Water

On May 5-9, 2014, more than 40 participants and experts met in Québec City to discuss about water-related challenges in the Great Lakes – St. Lawrence – Gulf territory and to draft a local action plan.

Meetings were scheduled between the experts and youth representatives over these three days encompassing the International Forum on Integrated Water Management. The experience helped young participants to broaden their understanding of water resources from 4 themes and acquire cross-disciplinary skills. A total of 15 projects were drawn up by the participants to be implemented locally. A statement (see further below) was written at the International Forum. Five representatives out of the 40 participants were chosen to convey North America's message in the World Youth Parliament for Water at the 7th World Water Forum in South Korea in 2015.

The gathering was organized by the International Secretariat for Water and was the result of the joint efforts of two forces: the *Great Lakes & St. Lawrence River and Gulf Symphony* and the *World Youth Parliament for Water*.

The aim of the Great Lakes & St. Lawrence River and Gulf Symphony is to encourage citizens to build a shared vision for this large basin containing 20% of the Earth's fresh water resources.

The World Youth Parliament for Water is a global network of young people which aims to coordinate youth activities and water-related pleas at the local, watershed or international level. For its next assembly which will take place at the World Water Forum in April 2015 in South Korea, preparatory continental meetings are being held to select and prepare young citizens to become better representatives of their region.

World Youth Parliament for Water North American Gathering Youth Message.

« *The Seven Generations Philosophy ensures that the knowledge and experience of the previous generations are passed on to future generations yet to come. This is both a right and a responsibility for the current generation.* »

We, the representatives of the North American Youth for Water Gathering as part of the World Youth Parliament for Water (WYPW), present our message on how to establish and strengthen a generational alliance for sustainable water management and stewardship. To progress effectively, we must continue to work between the generations locally and globally to protect and preserve water resources for all. Our past has shaped our present, and our present will shape our future.

As youth, we have the most at stake in the future. Therefore, our perspective must be taken seriously. We acknowledge the underlying issues of **youth apathy** and **generational discontinuity**, and strive to activate a strong youth presence in working alongside the fellow leaders of the world as partners in the preservation and proper management of water resources. In any major social movement, youth are the drivers of change; we bring exciting ideas to the table. Finding meaningful solutions from a youth perspective is imperative in the water sector and for sustainability. We must use the knowledge of our ancestors and our current understanding of world issues, collectively, to envision and build water security for future generations.

This text is the Introduction of the World Youth Parliament for Water North American Gathering Message. The complete version of the Message is available at the following address www.pmje-wypw.org.



PRESENTATIONS MADE AT THE INTERNATIONAL FORUM

Abstracts of the presentations were provided by the speakers. They were classified according to the themes and case studies showcased at the International Forum, and are displayed in chronological order. Only the affiliations of the speakers have been specified.

The full schedule of the conference is available on the [Sched platform](#).

THEME 1: GOVERNANCE AND INSTITUTIONAL CAPACITY BUILDING TOOLS

The Water Convention: A catalyst for cooperation on shared waters

Chantal Demilecamps (United Nations Economic Commission for Europe – Switzerland)

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) has supported the strengthening of cooperation on shared waters at both political and technical levels for more than 20 years. The session will present the Convention, its strengths, experience and relevance as an intergovernmental platform.

Water governance and institutional change

Delia Montero (Metropolitan Autonomous University – Mexico) and Catherine Choquette (Université de Sherbrooke – Canada)

The objective of this paper is to show the importance of the different features and elements of governance, the role of institutions in supporting water governance and the contribution of the latter towards institutional change.

Configuration and implementation of tools for the shared management of transboundary resources in Argentina. Contributions of some relevant legal cases

Leonardo Fabio Pastorino (National University of La Plata – Argentina)

Argentina has significant experience at the legislative, judicial and doctrinal level in the shared management of water resources. The country is involved in the integration and development processes with its neighbours and within its provinces. The law contributed to resolving conflicts by providing clear management guidelines regarding resources. The relevant cases will be reviewed in this presentation.

Best practices in transboundary water management

Jean-François Donzier (Réseau International des Organismes de Bassin, RIOB – France)

This presentation showcases examples of how to share best practices acquired in the field through know-how, information systems, knowledge transfer, training and tools.

IWRM case studies as the means for sustainable water resources development

Carol R. Collier US Army Corp of Engineers, Institute for Water Resources – United States of America)

Collaboration between different levels of authority in the management of transboundary rivers

Jean-Marie Wauthier (Wallonie-Bruxelles International – Belgium)

The roles of Belgian intra-national authorities in international negotiations regarding the Meuse and the Scheldt.

Nutrient Management In the Lake Winnipeg Basin – An Examination of Two Approaches

Mike Renouf (Environment Canada) and Nicole Armstrong

Excessive nutrients have increased the frequency and magnitude of algal blooms in Lake Winnipeg (world tenth largest). This presentation will examine two approaches to engage the governments of upstream provinces and states to put in place measures to reduce nutrient loading to the lake.

Interstate water agreements and resolution of interstate disputes in the Supreme Court of the United States

John B. Draper and Matthew E. Draper (Draper and Draper LLC – United States of America)

Case studies related to interstate agreements and resolution of interstate disputes over water will be described. Principles will be extracted from these case studies that may have potential for resolution of future transboundary disputes by agreement or adjudication.

Tipping the balance away from water conflict towards cooperation potential

Léna Salamé (UNESCO Division of Water Sciences - France)

Challenges of transboundary water management: the case of the Great Lakes & the St. Lawrence River (Canada/USA) vs. the management of the Colorado River (Mexico/USA)

Yenny Vega-Cardenas (Université de Montréal – Canada)

Both Canada and Mexico share transboundary waters with the United States. Although these countries belong to the same continent, there are significant differences in their management models. In the North, the focus is on integrated water management while the South is more favourable to the creation of international water markets.

St. John River watershed, establishing communication between three cultures

Michel Grégoire (Organisme de bassin versant du fleuve Saint-Jean – Canada) and Simon Mitchell

The St. John River watershed is shared between Québec, Maine and New Brunswick, and serves different aspects along its course. This presentation outlines the approach to be adopted to bring three cultures together in sharing a common resource.

A shared-vision planning toolbox for inclusive, open and transparent civil society input to intergovernmental decision-making for watershed planning

Hal E. Cardwell (US Army Corp of Engineers, Institute for Water Resources – United States of America)

The absence of Québec civil society in the early phases is not an option

Marc Hudon (Nature Québec – Canada)

The Québec Government is doing its part regarding the governance of the waters of the St. Lawrence/Great Lakes system. However, Québec will benefit more if its civil society could also get involved in the long run in dealing with the challenges at hand with a large number of non-governmental stakeholders participating in the early phases.

Demonstrating citizen involvement in the transboundary management of water: the Great Lakes & St. Lawrence River and Gulf Symphony, Professor Hippopotamus and the Niger River

Raymond Jost (International Secretariat for Water – Canada)

For over 15 years, the SIE-SEE and its partners have been acting as an intermediary for the different stakeholders at field-level. The priorities are different at the national and international level and the different parties involved end up having their own “private preserves” so to speak. It is through a sustainable institutional will and a common language that partnerships can be established. These approaches are explained using three examples: 1. The Great Lakes & St. Lawrence River and Gulf Symphony 2. Professor Hippopotamus and the Niger River 3. RhineNet and the local support network.

Collaboration, mobilization and joint actions across the Quebec part of the St. Lawrence

Jean-Éric Turcotte (Stratégies Saint-Laurent – Canada)

Stratégies Saint-Laurent and the ZIP committees have been involved in collaborative programs for twenty years. They are to play a pivotal role in the implementation of the new governance structure for Quebec portion of the St. Lawrence – the integrated management of the St. Lawrence (IMSL). Their contribution as coordinators for future regional roundtables and/or as organizations responsible for the Regional Integrated Management Plan (RIMP) will be valuable. The presentation gives an overview of successful joint actions for a better understanding of this network and the benefits it can bring forth.

Transboundary water management of Lake Chad: constructive collaboration or whitewash?

Frédéric Lasserre (Université Laval - Canada) and Inès Singhe

A lot of speculation exists about the role of climate change in the present-day decline in the size of Lake Chad. Beyond the polemic, it is important to be aware of the repercussions of increased water extraction upstream and to collaborate to better manage the impacts of this contraction. As in the case for what is done for other African watersheds, an institutional body was created to coordinate the actions of the riparian states. In this case it was the Lake Chad Basin Commission. What conclusions can be drawn from this multinational action for transboundary waters?

Seeking Simple Models of Highly Nuanced Systems: Building a Model of Water Quality Management

Steve Scheinert (University of Vermont – United States of America), Asim Zia, Christopher Koliba

The ability of a model to generate reliable and policy relevant output rests on the modeler’s ability to encode this complex mix of interdependent actors and interdependent rules in a single model, placing the construction of a valid model in a key role within the larger research project.

Watershed-based governance beyond administrative boundaries: how a lack of communication between dam managers and users of two provinces impacts use and infrastructure

Patricia Boutin (Organisme de bassin versant Abitibi-Jamésie – Canada) and Judith Sénéchal

The lack of communication characterizing the management of the water level crossing the provincial boundary from Lake Abitibi reservoir has serious environmental and socio-economic repercussions in Quebec. These impacts date back to more than 50 years and are directly linked to the absence of communication channels and structures between the stakeholders of the hydroelectric dam in Ontario and the water resources management stakeholders in Quebec.



THEME 2: TOOLS FOR MANAGING WATER RESOURCES AND WATER USAGE

Cooperation, assessment and management of transboundary aquifers – Overview of the aquifers located along the Canada/US boundary

Alfonso Rivera (Natural Resources Canada - Canada)

Transboundary groundwater and UNESCO

Léna Salamé (UNESCO Division of Water Sciences – France)

The importance of ecohydrology and the quantification of ecosystem goods and services as a key component of evaluation and trade-off analysis for IWRM

Janet A. Cushing (US Army Corp of Engineers, Institute for Water Resources – United States of America)

Strengthening the Case for Watershed Services in Marginalised Mountain Regions – Best Practice in Transboundary Management from Asia and Africa

Paul Egan (International Union for Conservation of Nature - Ireland) and Martin F. Price

Several case studies, from developing and least developed regions of the world, explore how strengthening the concept of watershed services as a form of 'payment for ecosystem services' can enhance the resilience of downstream areas to climate change, and provide much needed sustainable economic development in support of mountain livelihoods.

Hydrologic risk assessment in the Eastern Nile River Basin

Diane Arjoon (Laval University – Canada), Yasir Mohamed, Quentin Goor, Amaury Tilmant

Hydro-economic risks faced by downstream countries, when the Grand Ethiopian Renaissance Dam (GERD) will be online, are analyzed, using an integrated, stochastic hydro-economic model. Results indicate that, with cooperative management of the basin, the GERD would increase basin-wide benefits and would generate positive externalities during dry years.

Managing aquatic ecosystems beyond physical and political boundaries: methodological and organizational issues

Rodolphe Devillers (Memorial University of Newfoundland - Canada)

Strengthening community resilience to climate change in coastal areas: Research perspectives in a transboundary context

Steve Plante (Université du Québec à Rimouski – Canada)

Coordination and facilitation, the role of The Gulf of Maine Council on the Marine Environment: Looking at the past and envisioning the future

Kim Reeder (Climate Network of the Gulf of Maine – Canada) and Nicole Klenk

Safeguarding water intakes of Québec City

Jacques Deschênes (Québec City - Canada)

Québec City's drinking water is derived from surface waters. The intake from Saint-Charles River provides over 50% of the production of drinking water for Québec City. The watershed supplying this water is characterized by significant population density.

An action plan has set up to protect the watershed supplying the city's drinking water source. This action plan aims to maintain the quality of the drinking water and to ensure sustainable management of this resource. The implementation of the action plan covers regular field monitoring and a rapid and coordinated response to any incident.

The protection of water intakes in the territory of the Québec Metropolitan Community

Carole Beaugard (Québec Metropolitan Community - Canada)

PCSWMM 2D modelling of a river's flood plains in Québec City to manage rainfall runoff in a one-hundred-year flood taking into account climatic changes

Véronique Fortier (BPR - Canada), Boris Gervais Salou (Québec City - Canada), Marie Paré-Bourque

While making a blueprint of Québec City, a 2D model was created using PCSWMM so as to have a more accurate representation of the flow in the flood plain of a stream portion in the case of a one-hundred-year rainfall event taking into account climatic changes.

Evaluation of trophic level and ecological integrity of rivers in the suburban territory of Lévis using Eastern Canadian Diatom Index (IDEC: Indice Diatomees de L'Est Du Canada)

Martine Grenier (CIMA+ – Canada)

The Eastern Canadian Diatom Index (IDEC) was used in 2011 and 2012 to assess the trophic level and the level of ecological integrity of the main streams in the suburban territory of Lévis to guide restoration and conservation measures.

Management of boundary and transboundary waters: regulation, adaptation and collaboration

Jean-François Cantin (International Joint Commission - Canada)

Franco-Swiss transboundary collaboration: the need of setting up integrated water management in the Grand Geneva basin

Alain Wyss (Canton of Geneva - Switzerland), Bernard Gaud, Guy Maurin (Pays de Gex municipalities community - France), Hervé Fauvain

In the Grand Geneva basin, most rivers flow into Swiss territory from France. A transboundary collaboration involving several planning tools has been developed over the years to ensure the protection of rivers and to contain high flows and floods.

The Quebec-Vermont steering committee: Concerted efforts for the health of Lake Memphremagog watershed

Julie Grenier (Conseil de gouvernance de l'eau des bassins versants de la rivière Saint-François - Canada) and Ben Copans

The Quebec-Vermont steering committee for the management of Lake Memphremagog and its watershed is a joint initiative of the Government of Québec and the State of Vermont. Its mission is to collaborate in the planning of actions to improve and monitor water quality. The sharing of expertise and experience has enabled remarkable progress. While there are several benefits in maintaining such collaboration, it also comes with challenges. The conference will focus on the work of the committee, its successes and challenges.



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THEME 3: RISK MANAGEMENT AND CLIMATE CHANGE ADAPTATION TOOLS

Including considerations for adapting to global change as part of formulating resilient solutions to water problems

John Matthews (Alliance for global water adaptation – AGWA – United States of America)

Integrated watershed-based management as a resilience tool for communities in the context of climate change

Antoine Verville (Regroupement des organismes de bassins versants du Québec - Canada)

Integrated watershed-based management strengthens community resilience to climate change and promotes collaboration beyond administrative boundaries or limits related to the areas of responsibility of the stakeholders involved. The presentation is centered on some of the tools developed by the ROBVQ in this regard.

Adapting to climate change together in transboundary basins under the Water Convention

Chantal Demilecamps (United Nations Economic Commission for Europe - Switzerland)

Cooperation in adapting to climate change in transboundary water basins helps to prevent the negative impacts of unilateral adaptation measures and to maximize the benefits of cooperation. Work under the Water Convention, including a Guidance document, a network of pilot projects and exchange of experiences allows jointly discussing adaptation in a transboundary context.

Resilience and governance: stakeholder perceptions and climate change adaptation efforts in the Niagara River Watershed

Liette Vasseur (Brock University – Canada), Julia Baird, Ryan Bullock, Diane Dupont, Tim Heinmiller, Maryline Jollineau, Wendee Kubik, Ryan Plummer, Steven Renzetti

The Niagara River is flowing from Lake Erie into Lake Ontario and forms the border between Canada and the United States. We study stakeholders' perceptions of water scarcity, in terms of both quantity and quality, and how water governance may influence climate change adaptation efforts in the Niagara River Watershed.

A few certainties about the uncertainties in hydrological projections and their impact on decision-making

François Anctil (Université Laval - Canada) and Grégory Sellier

This project demonstrates the importance of using several climatic members and modelling tools to diagnose the impacts of climate change on water resources. The first condition is justified by the intrinsic uncertainty in the chaotic nature of climatic evolution, while the second results from the limits of our modelling tools.

Study of the risks of soil erosion by water using the geographic information system - case of the marly zone of the Oued Sly watershed (Northwest of Algeria)

Mohamed Remaoun (University of Chlef - Algeria)

Our approach has the following objectives:

1) Regrouping and mapping the various USLE factors involved in the erosion process by creating an interactive database containing codified and structured data of these factors. 2) Identifying the areas likely to produce sediments and evaluating soil losses by integrating the USLE model of Wischmeier & Smith (1978) into the Geographic Information System (GIS).

OSIRIS – flood risk management by communities of the Meuse basin

Xavier Caron (Établissement public d'aménagement de la Meuse et de ses affluents - France) and Sarah Combalbert

In order to manage the risk of flood and prepare the local communities of the French watershed of the Meuse, EPAMA has adopted an original approach based on the use of a decision-making software called OSIRIS. This tool takes into account official forecasts and local challenges and improves flood crisis management.

Management issues associated with climate change in the transboundary river basins of India

Shadananan K. Nair (Nansen Environmental Research Centre – India)

Climate change has large impact on the water resources and transboundary water disputes in India. Constitutional limitations and vested political interests are hurdles in resolving disputes. There are options to beneficially use the climate change to resolve disputes. Guidelines for a better policy and adaptation strategy have been provided.

The Emosson hydroelectric complex, constraints and opportunities of integrated water management

Marie Forget (Université de Savoie – France)

Following the Franco-Swiss Convention of 1964, the bi-national project of the Emosson hydroelectric dam undertook integrated transboundary management. European recommendations on the ecological status of rivers as well as important concerns regarding the impacts of climate change on the evolution of catchment areas, give us reason to explore changes in the transboundary management of the resource.

Redefining infrastructure: Construction, Ecosystems and Institutions

John Matthews (Alliance for global water adaptation – AGWA – United States of America)

Towards a water management process of the St. Lawrence River basin to counterbalance expected drying effects in the range of 20-30% due to climate change

Pierre Gingras (Independent Expert - Canada)

Completing the cascade dams that control the various water bodies of the St. Lawrence River basin would counterbalance the expected drying effects in the range of 20 to 30% due to climate change, protect 18,000 kilometres of shoreline, more than 1500 square kilometres of wetlands and to ensure the supply of drinking water to populations.



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CASE STUDIES ON THE MANAGEMENT OF THE GREAT LAKES AND THE ST. LAWRENCE

Governance mechanisms in the Great Lakes and St. Lawrence system and Québec-American States agreements

Marcel Gaucher (Ministry of Sustainable Development, Environment and the Fight against Climate Change - Canada)

Presentation on the evolution of transboundary water governance in Québec, particularly in regard to the major watershed of the Great Lakes & St. Lawrence River and that of lakes Champlain and Memphremagog. The aim is to demonstrate complementarity between the initiatives of federal governments and those of federated states and the key role of the latter in these collaborations.

The regional roundtable on integrated management of the St. Lawrence - Québec area

Robert Masson (Québec Metropolitan Community - Canada)

GLSLCI's Climate Resiliency and Adaptation Service for Municipalities

Philippe Chenard (Great Lakes and St. Lawrence Cities Initiative – Canada) and Nicola Crawhall

Through resources, training, case studies, pilot projects and a pledge to action, the Cities Initiative Climate Resiliency and Adaptation Service for Municipalities encourages members cities to go further in their adaptation activities in a way that protects its citizens and assets, as well as the water at their shoreline.

Green Marine, an example of stakeholder collaboration initiated by the private sector – the case of the Great Lakes and St. Lawrence basin

David Bolduc (Green Marine - Canada)

Potential impact of climate change on the uses of the St. Lawrence River and adaptation options: overview of an ongoing economic study

Nicolas Audet (Ouranos - Canada)

The development of an environmental numerical forecasting system for the Great Lakes and St. Lawrence basin to provide a decision-making tool for integrated ecosystem management

Pierre Pellerin (Environment Canada - Canada)

CASE STUDIES ON THE RHINE-MEUSE SYSTEM

Operational implementation of the international river commissions work on climate change adaptation into national water management documents: the French portion of the Rhine-Meuse basin

Pascal Duchêne (Rhine-Meuse Water Agency – France)

RhineNet or public involvement in the context of the EC Water Framework Directive

Raymond Jost (Sages for Water – Canada)

Meuse River adaptation to climate change and its effects: an exemplary transboundary collaboration

Xavier Caron (Établissement public d'aménagement de la Meuse et de ses affluents – France) and Sara Combalbert

During four years, the Meuse watershed (France) was the scene of a transnational collaboration project which brought together 17 partners from different backgrounds for a concerted and integrated approach to climate change adaptation and water management issues. A successful example of solidarity in the field.

The importance of transboundary collaboration in understanding the challenges of climate change adaptation at international watershed level: the example of the Rhine

Pascal Duchêne (International Commission for the Protection of the Rhine - Germany)

Implementation of the EC Water Framework Directive (2000/60/EC) in the Meuse international hydrographic district

Pierre-Nicolas Libert (Service public de Wallonie – Belgium)

CASE STUDIES ON THE RIO GRANDE/RÍO BRAVO WATERSHED

Collaborations for integrated water management of the Rio Grande/Río Bravo watershed

Samuel Sandoval Solis (University of California, Davis - United States of America)

Social contribution as a key element of water management: the case of Rio Grande Basin Council

Luis Armando Treviño Peña (Comisión nacional del agua – Mexico)

Transboundary challenges of environmental governance: the case of Rio Grande/Río Bravo

Luzma Fabiola Nava (Université Laval - Canada)

The case of Rio Grande/Río Bravo shows that the shared use of transboundary surface water resources leads to the emergence of a number of institutions and organisations to deal with the environmental challenges of complete distribution of the resource.

OTHER CASE STUDIES

Rhône governance: challenges for the progressive implementation of transboundary water management

Christian Bréthaut (University of Geneva - Switzerland) and Géraldine Pflieger

Cette communication présente une étude de cas concernant la gouvernance du Rhône caractérisée par l'absence d'organisation de bassin et par la faiblesse de ses mécanismes de gouvernance à l'échelle transfrontalière. Cette communication vise à comprendre les mécanismes actuels de gouvernance du fleuve et à analyser leurs capacités d'adaptation aux changements.

Transboundary Water Issues in a Development context in Afghanistan

Jean Jolicoeur (USAID – Afghanistan)

Presentation unavailable

Strategies of the local communities of the Usumacinta watershed in the fight against the effects of climate change: towards a participatory governance?

Jerome Gaudin (Universalia - Canada)

This communication presents an ethnographic case study of a community-based strategy at the scale of the Usumacinta river basin (Mexico and Guatemala). The main objective of the communication is to share the main findings and lessons learnt that emerged from the field, as a contributing tool for enhancing the integrated water resources management in the context of climate change.

CONCLUSIONS

The 3rd International Forum on Integrated Water Management was an enriching opportunity for the 300 participants hailing from across the globe (twelve countries, fourteen North American provinces and states were represented – see complete list [here](http://rv-eau.ca/Liste_Participants_3e.pdf) http://rv-eau.ca/Liste_Participants_3e.pdf) to learn from diverse contextual practices. Participants came from international organizations, governmental bodies (from the municipal to the supranational level), private or semi-public enterprises and the civil society at large. Such an attendance demonstrated the global interest in transboundary water management in today's backdrop of climate change.

The organizing committee structured the event around the following sub-topics:

- *governance and institutional capacity building;*
- *the management of water resources and their uses;*
- *risk management and adaption to climate change.*

Several high-level presentations under these sub-topics were followed by discussions with the audience. The organizers showcased several case studies, with a focus on North American initiatives such as the Great Lakes & St. Lawrence and the Rio Grande/Rio Bravo watersheds which may be less known internationally but deal with highly relevant challenges such as the regulation of water levels or resource-sharing.

Two sessions were proposed at the International Forum to support the global reflection on transboundary water management. One was based on transboundary groundwater management and the other, on the growing contribution of intra-national entities in transboundary water management.

Two workshops were organized where several participants presented new information. One workshop was about the benefits of transboundary collaboration concerning water (UNECE and UNU-INWEH) and the other one dealt with ecosystem-based adaptation to climate change in the context of transboundary water management (Commission on Ecosystem Management of the IUCN and UNESCO Chair for Community Sustainability at Brock University).

With the collaboration of the International Secretariat for Water, 40 environmental leaders-in-the-making drafted a Declaration for the North American gathering of the World Youth Parliament for Water.

This edition of the International Forum confirmed local and continent-wide interest in transboundary water management. This interest undoubtedly relates to the need to know more about the opportunities offered by this type of approach and how to further its development.

The speakers pointed out that watersheds are natural territories within which water flows regardless of national, administrative or other boundaries. The situation regarding aquifers though different, is nevertheless comparable. An actual integrated watershed-based management process consists of a transboundary approach. In the backdrop of climate change and tensions about water, transboundary management is important to overcome the negative impacts associated with the implementation of unilateral adaptation measures and the conflicts that would arise. Collaboration also facilitates the efficient implementation of adaptation measures. This is due to the exchange of more valuable information, planning at the watershed level and the possibility of fairly splitting the costs and sharing the benefits of the initiatives.

The presentation of numerous transboundary collaboration initiatives highlighted the following key elements for success:

- Leveraging real and sustainable political will to seize collaboration opportunities;
- Signing general or theme-based agreements and implementing them through appropriate governance mechanisms and partner institutions;
- Promoting constructive dialogue and identifying common interests;
- Building contacts and technical partnerships to strengthen the political aspect of the cooperation;
- Planning for the long term and cultivating patience.

The International Forum's programme illustrated the relevance of transboundary water management initiatives at different geographic levels: continental (e.g. the EU Water Framework Directive and the International Commission for the Protection of the Rhine), between two countries (e.g. International Joint Commission), between several federated bodies (e.g. Lake Champlain), between different government levels (e.g. St. Lawrence Action Plan) and between municipalities (e.g. Lake Saint-Charles). In general, the aim is to have a good vertical integration (between the different levels involved) and further improve it.

The importance of incorporating natural ecosystems to a greater extent was also highlighted. Solutions based on ecosystems effectively complement the functionality of man-made infrastructure, usually at a lower cost. Natural areas such as wetlands play an important role to palliate and adapt to climate change.

To end on a local note, we would highlight the existing number of transboundary initiatives in Canada. In Québec, these initiatives are mainly linked to the St. Lawrence and a handful of other watersheds. The need exists to structure initiatives already in place (St. John River, Lake Timiskaming) and to adopt the transboundary framework in order to avoid difficult situations such as the pollution risk posed by the American waste dump site planned upstream of Châteauguay River. It is important for the provinces (Québec and its neighbours) and municipalities to have the necessary prerogatives to manage water effectively in the context of climate change: management of natural resources including water, energy policies, and land use. To develop these new collaborations and further take into account the natural environment for integrated watershed-based management, adequate resources must be allocated to the stakeholders.



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