Ouranos' strategic plan
2004–2009 Horizon

Ouranos' strategic plan, 2004-2009 horizon

The mission

The mission of Ouranos is to acquire and develop knowledge on climate change and its impacts, as well as on socio-economic and environmental vulnerabilities, so as to inform decision makers on evolution of the climate and provide advice on the identification, evaluation, promotion, and implementation of local and regional adaptation strategies.

The vision

To make Ouranos into a national and international leader in the area of multidisciplinary scientific research into regional climatology and, with its partners, a leader in evaluating impacts and vulnerabilities as well as in developing climate change adaptation strategies and decision-making tools within a sustainable development framework.

Members

Ministère de la Sécurité publique
Ministère des Ressources naturelles et de la Faune du Québec
Ministère de la Santé et des Service sociaux
Ministère du Développement durable, de l'Environnement et des Parcs
Ministère des Affaires municipales et des Régions
Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec
Ministère des Transports du Québec
Ministère du Développement économique, de l'Innovation et de l'Exportation du Québec
Hydro-Québec
Environment Canada
Université Laval
Université du Québec à Montréal
McGill University
Institut national de la recherche scientifique

The context

According to the Intergovernmental Panel on Climate Change (IPCC), there is a broad consensus within the international scientific community to the effect that human activities, in particular the wide-scale use of fossil fuels, are altering the planet's climate and causing a rapid warming. This type of change could be accompanied, among other things, by increased climate variability and a higher frequency of extreme climate events.

Major meteorological events having occurred in Quebec over the past ten years, such as the floods in Saguenay in July of 1996 and the ice storm in January 1998, focussed attention on our vulnerability to this type of incident.

Development of climate models throughout the world, made possible by scientific advances and more powerful computers, have yielded a deeper understanding of the linkages between greenhouse gas concentrations, resulting from human activities, and climate change. Despite these developments, substantial efforts must still be deployed to quantify, and if possible reduce, uncertainties arising from various climate simulations and to optimize their applications to the regional scale.

Methods for evaluating the impacts of climate change on the physical, environmental, and human (social and economic) level are less developed than those linked to climate modelling.

In Canada and Quebec, such assessments are, of necessity, complex, owing to the size and diversity of the territory, as well as the many issues involved.

The issues

Quebec, and Canada, being located in northern latitudes characterized by long and harsh winters and a large snow and ice cover, will be affected by climate change to a greater extent than the more temperate regions of the Northern Hemisphere,.

These changes will have impacts that differ between geographical zones, economic sectors, and population groups as a function of their vulnerability.

- In Quebec's Arctic region, we may observe, in the coming years, a rapid thawing of permafrost, leading to a deterioration of airport infrastructures and building along with substantial modifications to ecosystems and lifestyles.
- As to Quebec's maritime zone, rising sea levels, more frequent storms, and reduced ice cover will likely increase coastal erosion and create greater risks to the road system and the security of the population.
- Substantial impacts, both negative and positive, are expected on forestry and hydroelectric resources, affecting the Quebec economy and many communities in the resource-based regions.
- Many other sectors will also be impacted, especially transportation, building, and urban infrastructures. Their design will need to respond to the new climatic context.
- In Southern Quebec, several sectors of the economy that are vulnerable to climate variability, including agriculture, river navigation, tourism, and energy demand, will require measures to curb the costs and optimize the benefits of climate change.
- Natural ecosystems and biodiversity will also be affected, owing to the pace of the expected changes relative to the adaptative capacity of these environments, which are already subject to a number of pressures from human activities.
- On the social level, native communities and those whose economies and employment depend largely on natural resources will be particularly impacted. They will need development strategies that lessen their vulnerability.
- Finally, populations that are most vulnerable to climate change, whether because of the state of their health, their age, or their socio-economic status, will require greater attention.

In order to elaborate appropriate adaptation strategies, decision makers in all fields must have access to the most precise information possible on the nature, scope, and speed of regional impacts expected from climate change. Notably, this applies to the ministries of transportation and public security, which will need to confront the thawing of the

permafrost and the change in coastal environments. This is also the case for Hydro-Québec, which needs to fully grasp the variability and the long-term durability of water inflows into its reservoirs.

The nature of the required information is highly diverse, and an integrated and multidisciplinary approach is called for. Regional, or even local, climate scenarios are needed, as well as climate, hydrological, geospatial, biophysical, economic, sanitary, and social data on the regional scale. Acquiring, analysing, and integrating this type of information represents no small challenge. In this respect, no institution or organization currently has access to all the resources and expertise required to address the problem in its entirety. This gives rise to the importance of enabling the pooling of available resources and developing complementary actions.

The complementarity of Ouranos

The scope, diversity, and complexity of the issues require a coordinated effort that draws on all available resources. While various organizations within Canada and Quebec have—each within its own domains—addressed the issue of the impacts of, and adaptation to, climate change, none has pulled together experts in climatology and in physical, human, and societal impacts.

Ouranos was specifically created to fill that void and oversee the complementarity of these various labours. With its considerable computing power and expertise, Ouranos has a strategic role to play bringing together the competencies and resources necessary to meet the challenges raised by climate change. Thus, Ouranos must stimulate research amongst its partners and develop the skills and other know-how required for its mission.

Existing organizations

Several Canadian and Quebec institutions are specifically working on climate change, studying both climatology and impacts and adaptation. These particularly include:

Climatology

- The Canadian Centre for Climate Modelling and Analysis (CCCma), which is developing the Canadian Coupled Global Climate Model (CGCM).
- The National Archive and Data Management Branch of Environment Canada, which is responsible for managing information and climate data nationwide.
- The Climate Change Scenarios Network, of which Ouranos is a node, has the mission of providing information, tools, services, and documents required for constructing scenarios for analysing impacts and adaptation.
- The Canadian Regional Climate Modelling Network which, in association with the Centre pour l'étude et la simulation du climat à l'échelle régionale (Centre ESCER) of the Université du Québec à Montréal, oversees development of the Canadian Regional Climate Model (CRCM).
- The Global Environmental and Climate Change Centre (GEC3) at McGill University, developed in partnership with Ouranos.
- The Université du Québec à Rimouski, which is pursuing research into marine sciences and ocean modelling on the regional scale.

Impacts and adaptation

- The Climate Change Impacts and Adaptation Program (CCIAP) is used by Ouranos to support some thirty impact studies in various university centres.
- The Adaptation and Impacts Research Group (AIRG) and the Canadian Climate Impacts and Adaptation Research Network (C-CIARN), of which Ouranos is the Quebec node.
- The Centre de ressources en impact et adaptation au climat et à ses changements of Environment Canada (CRIACC).
- Saskatchewan's Prairies Adaptation Research Collaborative (PARC), consisting principally of analysts in impacts and adaptation.
- Université Laval's Centre d'études nordiques (CEN), one of the oldest research centres into environmental and human changes in northern Quebec.
- ArcticNet, a Network of Centres of Excellence of Canada, which gathers scientists and managers from the natural sciences, health, and social sciences, along with their partners, and which studies the impacts of climate change in the Canadian Arctic.

The role of Ouranos

As a result, the Government of Quebec, Environment Canada, and Hydro-Québec created the Ouranos consortium in 2001. Ouranos, which also includes four Quebec universities, strives to ensure a better match between research efforts and the user's needs.

Ouranos is responsible for generating **regional climate change forecasts** for all of Canada using various models, including the Canadian Regional Climate Model (CRCM). Among other things, these models allow more detailed examination of the repercussions global climate change has on regional hydrological and geochemical cycles.

Ouranos provides **support to researchers** in various research centres and universities, making available to them the best data and downscaling approaches for their particular needs.

In terms of **impact and adaptation studies**, Ouranos plays the **role of catalyst** by bringing together analysts, users, and decision makers to define study projects. Its role and support in the matter of **setting up networks** with various partners throughout Quebec will allow it to optimize the utilization of all resources available in research and funding bodies.

Through the various initiatives and the priorities of its members, Ouranos **promotes the advancement of research in order** to list as exhaustively as possible the main vulnerabilities and to contribute to developing a coherent adaptation strategy. Finally, from its ideal vantage point, Ouranos exercises a key role in **raising awareness** among the public and decision makers.

Ouranos contributes to the **international diffusion** of Quebec and Canadian research. Thanks to several collaborations already established, especially with Météo-France and the North American Regional Climate Change Assessment Program (NARCCAP), Ouranos has succeeded in taking a place amongst prominent actors in the field of climate modelling. In addition, Ouranos has been invited on several occasions to participate in international activities that link climate sciences with the evaluation of impacts and adaptation.

Implementation of the Kyoto protocol and a stronger emphasis on adaptation will create a greater need for such expertise and could bolster Ouranos' role.

The mandates

Assist Ouranos members in their missions by advising them on priority areas of intervention and the development of adaptation strategies to mitigate the impacts of climate change, or to capitalize on its benefits.

Identify and assess potential impacts of climate change as well as socio-economic and environmental vulnerabilities of the main sectors and regions of Quebec in the framework of the research programming approved by the members.

Alert the authorities to the realities of climate change and to the adaptations required to confront them, and satisfy the requests of members in raising awareness and informing the general public and other specific audiences.

Collect, analyse, and facilitate access to data and other types of information concerning past climate variations.

Analyse the explanatory processes by which the current climate and its variations, as well as extreme events, exercise their impact on natural environments and human activities.

Expand knowledge and the ability to project climate onto the regional scale by developing simulation tools and adequate statistical methods.

Produce projections of the likely evolution of the regional climate and its characteristics in a context of climate change, and evaluate the associated uncertainties.

Make available to the members the analysed and documented data in keeping with international recommendations as well as the principal results from simulations and other scientific efforts.

Recruit and bring together multidisciplinary teams from universities and public and parapublic institutions labouring in the fields of climatology, climate simulation, statistical analysis, impacts and adaptation to climate change, and make their skills and knowledge known throughout Quebec and Canada.

The values

Excellence

Maintain integrity and work quality along with scientific rigour.

Pertinence

Respond to the needs and requirements of the members and society.

Integration

Establish an environment within Ouranos that is conducive to the staff's professional development and participation and implement transparent management practices.

Leadership

Exemplify the partnership approach on the national and international scale by the usefulness and the quality of the actions undertaken.

Openness

Ensure an environment for communication that is propitious to multidisciplinary work internally as well as externally.

The orientations

Orientation 1

Offer quality services to decision makers and users by ensuring that their requirements are fully met.

Orientation 2

Analyse the impacts on natural and human environments and contribute to assessing the vulnerabilities of priority sectors and regions in Quebec and elsewhere.

Orientation 3

Consolidate and develop expertise that is recognized nationally and internationally, in climatology, climate modelling, and in the analysis of impacts and adaptation.

Orientation 4

Create a profile of the future regional climate, using several models and a cross-section of scenarios, along with estimates of the associated uncertainty.

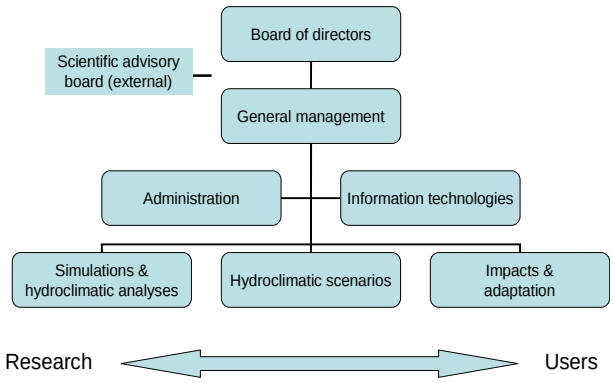
Orientation 5

Provide Ouranos with an efficient management structure that fosters achieving goals and maximizes the leverage effect on Quebec and Canadian research into climate change.

The resources

In order to accomplish its mission, Ouranos has adopted a structure comprising three scientific programs:

- Simulations and hydroclimatic analyses,
- Hydroclimatic scenarios,
- Impacts and adaptation.



Human Resources

Ouranos directly draws on the efforts of 27 staff members, as well as approximately 27 employees, on the basis of average annual commitments, on loan from members. It also calls on a network of some 250 collaborators for its various projects.

Nine provincial and federal ministries and organisations participate in Ouranos' labours, as well as four universities: Université du Québec à Montréal, McGill University, Université Laval, and the Institut national de la recherche scientifique.

The human resources provided by Ouranos members should make it possible to accomplish the tasks and mandates described in this strategic plan.

Financial resources

Ouranos is a non-profit organization. Its annual budget is $4 million plus, on average annually, an in-kind contribution of staff from members of $2.5 million and a further $300 thousand in project-specific funding.

The pooling of human, financial, and technical resources allocated on a recurring basis, including the leverage effect from the co-financing of projects, is evaluated at nearly $10 million annually. Additional financial resources would allow Ouranos to pursue is mission in greater depth.

Physical resources

The premises of Ouranos are at 550 Sherbrooke Street West, in Montréal's city centre, near the Université du Québec à Montréal, McGill University, and Hydro-Québec's headquarters. It offers work spaces that can accommodate over one hundred permanent and guest specialists, as well as several rooms for meetings, workshops, symposia, seminars, courses, and multimedia presentations.

Access to powerful computing facilities is indispensable for Ouranos to pursue its mission. Through agreements, subsidies, and own funds totalling nearly $3.8 million, Ouranos disposes of a Silicon Graphics supercomputer, three Cray supercomputers, and a very high-capacity library. These computing resources are adequate for the time being. However, with ongoing developments in computer technologies, these types of systems are characterised by rapid obsolescence to which Ouranos will have to constantly adapt.

The indicators and targets

Orientation 1

Offer quality services in impacts and adaptation to decision makers and users by ensuring that their needs are fully met.

INDICATORS	TARGETS
Number of sectors in which Ouranos studies have given rise to actions.	Adaptation-related decision making by users in at least four sectors in three years.
Availability of useful data and information.	Making available the results of four impact and adaptation reports per year as of 2006. Making the climate database available to the general public. Maintaining the Website.
Users' satisfaction rate.	Survey results: 75% satisfied or very satisfied
Raising public awareness.	Ten presentations or interventions per year, targeted at the general public and specific audiences, as of 2005.

Orientation 2

Analyse the impacts on natural and human environments and contribute to assessing the vulnerabilities of priority sectors and regions in Quebec and elsewhere.

INDICATORS	TARGETS
Climate forecasts serving for impact and adaptation projects.	Five documented projections per year as of 2005.
Economic, social, and environmental impact and vulnerability studies covering key sectors in Quebec.	Five studies per year as of 2005.
The number of regions studied within and outside of Quebec.	In 2008, most regions within, and two outside of, Quebec.
Number of decision makers and stakeholders reached in the various sectors.	Having reached the main decision makers in some ten sectors.

Orientation 3

Consolidate and develop expertise in climatology, regional modelling, and the analysis of impacts and adaptation that is recognized nationally and internationally

INDICATORS	TARGETS
Developing a regional climate model.	Two applications of the CRCM model to other regions of the world.
Simulating the climate using various regional models.	Climate simulations in Quebec using at least two regional models framed by at least two global models.
High-quality contributions to science.	As of 2005, five publications per year in major scientific journals. Annually, three of: chairing symposia, invitations as principal speaker, or participating in organizing committees.
Contributing to Canadian and international organizations.	Five international bilateral or multilateral collaborations. Participation in writing reports on the Canadian scale and various national committees. Participation in writing reports of the IPCC and other panels of experts.
Contributing to the international renown of Quebec and Montréal.	Organizing biennial international scientific symposia on various subjects in Ouranos' scientific programming (as of 2004).

Orientation 4

Create a profile of the future regional climate, using several models and a cross-section of scenarios, along with estimates of the associated uncertainty.

INDICATORS	TARGETS
Models for analysing and characterizing the mean future climate on the regional scale (trend and variability), as well as extremes.	Analytical and statistical models developed for analysing trends and variability, as well as the occurrence, intensity, duration, and frequency of extreme events. Statistical scaling methods. Dynamic and comparative statistical scaling methods.
Methods for analysing and quantifying uncertainties related to climate modelling and simulations.	Holistic forecasting methods drawing on global and regional models.
Satisfaction of the models' users.	The statistical and dynamic approaches elicited a 75% satisfaction rate among users.
Cooperation with organizations outside of Quebec.	Signature of two agreements for sharing results with organizations outside of Quebec in 2008.

Orientation 5

*Provide Ouranos with an efficient management structure that **fosters achieving goals** and maximizes the leverage effect on Quebec and Canadian research into climate change.*

INDICATORS	TARGETS
Rate of co-financing.	Co-financing at 100% by project and 60% for the programming as a whole.
Number of joint projects or shared activities.	Attain 60% of projects involving more than one partner.
Organization and structure of the consortium as it relates to programming-related activities.	Have the BD adopt core administrative documents (organization chart, job descriptions, rules governing delegation) by the end of 2006.
Efficiency of human resources management.	Identifying the tasks and responsibilities for each employee. Establish a procedure for evaluating and classifying employees.
Satisfaction of Ouranos employees and contributed staff.	Employee satisfaction rate 75%.

Concluding remarks

Ouranos' strategic plan for the period 2004–2009 seeks to reiterate Ouranos' role and mission, and to specify how it intends to make useful to decision makers and the population of Quebec the most recent scientific developments in the areas of climatology, and impact and adaptation studies on climate change.

Refining the **Canadian Regional Climate Model**, producing more simulations, and **generating climatic forecasts** will allow the nature of potential climate changes to be determined at an appropriate scale in the various regions of Quebec. Concurrently, **impact analyses** will shed light on the links between climate change and assorted social, economic, and environmental stakes for local communities in Quebec's different climate regions as well as for the province as a whole.

On the 2004–2009 planning horizon, Ouranos should also be able to sketch a portrait of the entire climate and the **principal vulnerabilities** of Quebec's priority sectors and regions. Thus, it will be able to provide quality support to decision makers and users who will have to make **adaptation decisions** by ensuring that the scientific products truly meet their needs.

Ouranos has achieved remarkable accomplishments since its relatively recent creation and has acquired a reputation for competence and rigour as much amongst the general public and the media as within the scientific community. Collaborations are already spreading its renown onto the international stage. The next years will allow it to consolidate and develop this reputation. Ouranos thus hopes to be a key lever for research in Quebec with the assistance of its scientific partners. It also seeks to be a leader in its role supporting public institutions and in the rigour with which it addresses problems linked to climate change.