Institut nordique du Québec

Together for the North

2021 | 2022

ACTIVITY REPORT

This activity report covers the period from April 1, 2021, to March 31, 2022.
Photo credit for cover photo: Paul C Sokoloff/Canadian Museum of Nature/ArcticNet

Source/ Mafalda Miranda, INRS

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INQ
AT A GLANCE

Source/Catherine Van Doorn

16
Québec university member institutions

250+
affiliated researchers

90+
affiliated research entities
(research centres, laboratories, institutes, and groups)

67
Research Chairs with an INQ-affiliated chairholder

4
founding nations
(Inuit, Cree, Innu, and Naskapi of Kawawachikamach)

3
INQ Research Chairs

8
research projects underway

5
committees and working groups devoted to priority issues in the North and rallying over 80 individuals with diverse expertise

15+
knowledge transfer activities in 2021-2022

Source/Sophiane Béland

VISION

The vision of Institut nordique du Québec (INQ) reflects its partners' desire and determination to develop a sustainable North on a foundation of knowledge. Integrate scientific knowledge with that of local communities, including Indigenous knowledge, and partner with the public and private sectors to develop the Canadian Arctic and Northern Québec for future generations: clean energy, healthy ecosystems, viable infrastructure, economic prosperity, vibrant cultures, and education and healthcare systems that meet their needs.

MISSION

Unite the stakeholders in northern and Arctic research (natural sciences and engineering, health sciences, social sciences, and humanities) to promote innovation, and to create synergy between researchers and the end-users of research so as to provide governments, northern communities, and the private sector with the knowledge and expert workforce required for the sustainable development of Northern Quebec and the Canadian Arctic.

VALEURS

INQ's actions are motivated by the following values:

> Excellence in research
> Scientific rigour
> Inclusion of partners
> Sharing of resources

A WORD FROM THE DIRECTORS

Despite experiencing another atypical year marked by the pandemic, it is with great pride that we present the 2021-2022 activity report. The INQ team continued to carry out its scientific and development activities. While a good number of research teams were able to travel to the North, most of our activities once again took place in virtual mode.

Among the year's highlights were the substantial $3 million in operating funding granted to Institut nordique du Québec (INQ) for the next three years by Ministère de l'Énergie et des Ressources naturelles du Québec and Société du Plan Nord. INQ and Université Laval also received a $5.5 million grant from Global Affairs Canada to implement the Secretariat of the Arctic Council's Sustainable Development Working Group, an important step in bolstering INQ's reputation on the national and international stage. INQ's active participation in the 2021 National Building Reconciliation Forum also garnered attention. This event supported by Universities Canada to further reconciliation efforts in Canada's universities enabled INQ to promote its avant-garde vision of research ethics in the North. Another noteworthy achievement was the fact that the Atiku knowledge portal now works in collaboration with Bibliothèque et Archives nationales du Québec (BAnQ), a partnership that has helped considerably expand the First Peoples of the North collection.

Since research is at the core of INQ's activities, the seven projects funded by the INQ-Sentinel North (SN) partnership went ahead in the North, despite certain travel-related challenges posed by the government's health restrictions. INQ's three Chairs received the necessary funding to renew their mandates. A new research project emerged thanks to a partnership between INQ, Centre d'expertise en gestion des risques d'incidents maritimes (CEGRIM), and Réseau Québec maritime (RQM). This unique intersectoral and interdisciplinary project is a prime example of partnership and co-construction with Northern communities.

Also new this year, INQ, through its Sustainable Development working group, drafted an analysis charter based on 19 sustainable development (SD) goals, 17 of which have been enshrined by the United Nations. An INQ-SD symbol was also created. With the help of this new visual cue, projects with a sustainable development focus are easily identifiable.

With regard to training, the *Introduction to Northern Research and Issues* course aimed at researchers just starting their careers was a resounding success. After a hiatus of more than two years, the in-person training in Saint-Gédéon in the Lac-Saint-Jean region allowed 20 students from 11 different universities to learn from 20 seasoned educators. Also of special note this year was the continued interest in our *MOOC on Northern Québec*. The 1,600-or-so people who enrolled in the course hailed it as one of the most impactful courses in their educational or professional careers. The INQ webinar series also continued to attract new followers. Twelve online presentations featured guest speakers from universities, cegeps, and northern organizations who shared their knowledge on a wide variety of topics to an engaged and attentive audience. Scientific news continued to be disseminated with a series of more than ten new articles written by science journalist Valérie Levée highlighting the expertise of researchers working north of the 49th parallel.

In terms of infrastructure, the promotion of the leading-edge equipment at Lab-O-Nord confirmed the significant interest among users for this digital platform. The site saw more than 500 visits per month. The team continued its work on the future INQ scientific complex that will be built on the Université Laval campus, while a new partnership was forged with the university's Centre d'études nordiques to establish an INQ field station in Umiujaq, Nunavik. Meanwhile at the Uapishka Station, new research instruments were installed to advance knowledge acquisition in the area.

Once again this year, INQ was fortunate to be able to count on its loyal financial partners, and we thank them for their unwavering support: Ministère de l'Énergie et des Ressources naturelles du Québec, Société du Plan Nord, Ministère des Relations internationales et de la Francophonie du Québec, Secrétariat du Québec aux relations canadiennes, Ministère de l'Économie et de l'Innovation du Québec, and Université Laval, notably through its Sentinel North program.

In short, 2021-2022 was a year marked by continuity, a year that proved the determination and growing interest of members and partners for INQ's activities. It was a year that reflected the commitment of everyone involved to promote the development of innovative solutions to environmental challenges in the North.

Eugénie Brouillet
Chair, Executive Committee
Institut nordique du Québec

Jean-Éric Tremblay
Scientific Director
Institut nordique du Québec

Brigitte Bigué
Executive Director
Institut nordique du Québec

INQ is proud to present this activity report highlighting its diverse actions, the strength of its network, and its tireless determination to promote innovation so as to provide governments, northern communities, and the private sector with the knowledge and expert workforce required for the sustainable development of Northern Québec and the Canadian Arctic.

2021-2022 HIGHLIGHTS

$3 MILLION IN OPERATING FUNDING FOR INQ'S ACTIVITIES

The Government of Québec's 2021-2022 budget earmarked $3 million for INQ to carry out its activities and develop innovative solutions to environmental challenges of the North. The news was met with enthusiasm by the INQ team and all its members and partners.

INQ STEPS UP TO COORDINATE VACCINATION CAMPAIGN

At the request of Université Laval, INQ helped coordinate a COVID-19 vaccination campaign for members of research teams headed north of the 49th parallel to conduct their projects. In Spring 2021, the northern communities largely consented to allow the research teams to stay in the communities, when necessary. However, the health authorities required that the scientists must have received at least two doses of vaccine, in order to reduce the risk of spreading the virus. Thanks to the targeted vaccination campaign, several research team members were able to get their second shots earlier, allowing them access to the country's northern and Arctic regions to continue their research.

Sustainable Development Working Group

INQ AND UNIVERSITÉ LAVAL TO HOST THE SECRETARIAT OF THE ARCTIC COUNCIL'S SUSTAINABLE DEVELOPMENT WORKING GROUP

On May 20, 2021, at the ministerial meeting of the Arctic Council in Iceland, Minister of Foreign Affairs Marc Garneau announced that INQ and Université Laval would host the permanent Secretariat of the Arctic Council's Sustainable Development Working Group (SDWG). This news marked an important milestone for INQ as it reinforces Québec's position as a key reference for all issues related to sustainable development in circumpolar regions. In the wake of this exciting announcement, the INQ team worked together with SDWG, Crown-Indigenous Relations and Northern Affairs Canada, and Global Affairs Canada to set up the Secretariat at Université Laval. This collaboration led to the signing of a contribution agreement between Université Laval and Global Affairs Canada on March 31, 2022. Since then, all of the parties involved have been working hard to create this new structure, which will help improve environmental, economic, and social conditions of communities in the Arctic.

> *SDWG is one of the Arctic Council's six working groups. Its mandate is to propose and adopt measures Arctic states can take to advance sustainable development in the Arctic. This includes seeking out ways to protect and improve the environment, economy, culture, and health of Indigenous communities and other inhabitants of the Arctic. Its actions aim to create self-sufficient, resilient, and healthy Arctic communities for current and future generations, while protecting the environment and creating conditions conducive to the preservation of cultural traditions.*

Source/Catherine Chagnon

INQ PLAYS AN ACTIVE ROLE IN NATIONAL BUILDING RECONCILIATION FORUM

INQ was a partner of the 6th edition of the National Building Reconciliation Forum developed in co-construction by Université Laval, the Université du Québec network, other partners from the post-secondary education community, and a number of First Nations and Inuit organizations. Held under the theme "Falling into step with First Peoples students," the Forum, which was held online due to pandemic restrictions, sought to rally the main actors—both Indigenous and non-Indigenous—from the university community to gain a better understanding of the cultural and historical realities of the First Nations and Inuit in Canada with regard to education.

In response to the call for commitments launched by the event organizers, INQ proposed a presentation of its *Research Guidelines*. These guidelines were published in 2017 by the INQ's First Peoples Committee. The work has since become the go-to reference for research ethics in Northern Québec. Among the forty-or-so proposed commitments submitted to the Forum organizers, only four were retained, including the one by INQ. Melissa Saganash, Director of Cree-Québec Relations at the Grand Council of the Crees, and Leader of the INQ First Peoples Committee, presented the guidelines to the 200 people who signed up for the workshop entitled "Research By, For, and With First Peoples." Also of note is that of the six workshops held during the Forum, the one on research attracted the most attendees. The workshop audience consisted of representatives of post-secondary institutions (78%) and Indigenous organizations (just over 6%). The remaining participants were from various backgrounds, including government and community organizations. The student population represented roughly 11% of the workshop participants.

BIBLIOTHÈQUE ET ARCHIVES NATIONALES DU QUÉBEC (BANQ) TEAMS UP WITH ATIK^{U} PORTAL

The addition of Bibliothèque et Archives nationales du Québec (BAnQ) to the AtikU Portal has led to a significant expansion of the *First Peoples of the North, General Public*, and *Primary Archives and Sources* collections. The resources to which BAnQ provides access focus specifically on northern and Indigenous documentary heritage. They include rare documents and visually attractive collections that deal with anthropology, ethnology, geography, history, and Indigenousness. Most of the resources shared by BAnQ through Atik^{U} are open access or available through digital lending free of charge to all residents of Québec. With this recent contribution from BAnQ, the Atik^{U} Portal is now, more than ever, a leading platform for the dissemination of knowledge about the North and the Arctic.

INTERACTIVE MASTER CLASS ON USING VIDEO PRODUCTION TO DISSEMINATE RESEARCH FINDINGS, AND AN INITIAL CALL FOR PROPOSALS FOR A "COLLABORATIVE NORTHERN LEXICON" – DIALOGUE GRANT

INQ, in partnership with INRS professor Jasmin Raymond, has received a DIALOGUE grant to create a collaborative lexicon. A substantial amount of digital content was developed over the course of the year and will be gradually unveiled in Spring 2023. In addition, a technical training session on video production led by scientific content creator Viviane Lalande was offered to the entire INQ community.

Source/Rachel Guindon

ACTIVITIES CONTINUE ONLINE FOR A SECOND STRAIGHT YEAR

INQ WEBINARS STILL OFFERED

Twelve webinars were offered during the year. The presentations, which were mostly of a scientific nature, were given by experts from various fields. The topics addressed were intersectoral and reflected INQ's mission. One of the webinars focused on the impact of exposure to heavy metals on the mental health of Nunavik teens. Another looked at intercultural cohabitation on the North Shore between the Innu community of Nutashkuan and the village of Natashquan. A third presentation examined the winter growth of phytoplankton in the Arctic Ocean. These examples illustrate the wide spectrum of expertise we were able to share with participants seeking to further their knowledge. Each of the five INQ research priorities was reflected in these webinars.

The online presentations generated over ten hours of relevant content in connection with the North and the Arctic. They have been added to the 30 other webinars already available for viewing on INQ's website. The webinar collection constitutes an important and diverse bank of knowledge on issues specific to northern regions and to the cutting-edge research being conducted there. Since its creation in April 2021, the INQ webinar series has provided a platform for over fifty presenters from various backgrounds: universities, Indigenous organizations, community members, public and private members, and government institutions.

The following researchers shared their expertise in INQ's 2021-2022 webinars:


Martin Bourbonnais
Cégep de Jonquière


Mathieu Landriault
University of Ottawa

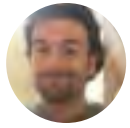

Michelle Garneau
UQAM


Pierre Francus
INRS

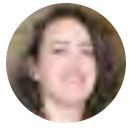

Gildas Tapsoba
Cégep de Jonquière


Stéphane Roussel
ENAP


Suzanne Lalonde
UdeM


François Lapointe
University
of Massachusetts


Achim Randelhoff
ULaval


Annie DesRochers
UQAT


Cecile Aenishaenslin
UdeM


Dave Saint-Amour
UQAM


Mark Patterson
Northeastern University


Jean-Francois Payette
UQAM


Jean-Pierre-Desforges
McGill


Laurie Guimond
UQAM


Léa Delesalle
UdeM

MY NORTHERN PROJECT / MON PROJET NORDIQUE | 2021 EDITION

For the second consecutive year, students interested in popularizing their scientific work and presenting it to the general public were invited to submit a video summarizing their northern research.

Two students in particular distinguished themselves at this second edition. Agathe Allibert, a PhD student at the Faculty of Veterinary Science at Université de Montréal, won the "People's Choice" award and was selected for the competition's international final. Valérie Langlois, a PhD student in microbiology at Université Laval, was also selected for the international final and took home the "Most Captivating Video" award presented to the person whose video received the greatest number of views on YouTube.

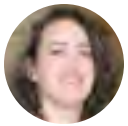

Agathe Allibert


Valérie Langlois

SCIENTIFIC NEWS

To celebrate the excellence of Québec's northern research and highlight the various challenges and issues, INQ launched a series of scientific articles devoted to the work being conducted within its community. The articles are written by science journalist Valérie Levée. Every month, she interviews research teams and presents a fascinating and reader-friendly snapshot of the research being conducted north of the 49th parallel. Nine articles were published in 2021-2022. The Scientific News articles are available in English and French on the INQ website.

Discover the work of these scientists through her wonderful articles.


Annie DesRochers
UQAT


Gérard Duhaime
ULaval


Caroline Desbiens
ULaval


Jasmin Raymond
INRS


Éric Rosa
UQAT


Justine Gagnon
ULaval


Esther Lévesque
UQTR


Kristin Bartenstein
ULaval


Frédéric Lasserre
ULaval


Vincent Cloutier
UQAT

INQ TRAINING: IMMERSIVE AND IMPACTFUL

Training is one of the pillars of INQ's mission. Two resounding successes bear testament to its commitment to train the next generation of skilled scientific researchers and raise public awareness of the singular realities facing northern communities and regions.

AN INTRODUCTION TO NORTHERN RESEARCH AND ISSUES | 2021 EDITION

This training is offered every two years and aims to arm young researchers with the tools they need to prepare and carry out their research projects in the North. Each edition is revisited and improved by different specialists, and addresses a specific theme based on the needs expressed by or observed within the student population. The 2021 edition focused on mobilizing and sharing knowledge. Twenty students were selected to take the training course following a call for applications.


Source/Pierre Coupel

The students hailed from 11 different universities, including 4 outside Québec (Waterloo, Manitoba, Moncton, and Ottawa). Eleven instructors shared their expertise. These mentors came from the university and government community as well as from Indigenous organizations.

Equipping the next generation of northern scientists
This was the second edition of the training session. The first took place in 2019 and was put together by experienced scientists. Their goal was to provide students with the training they themselves would have liked to have received before heading out for their first research foray in the North. This goal is fundamental to the development of the various components of the training.

MOOC ON NORTHERN QUÉBEC | A FREE COURSE OPEN TO ALL

A total of 1,661 people signed up for the MOOC in 2021-2022. Available on an annual basis since 2017, our MOOC has a well-established reputation. Hailed on numerous occasions by participants as one of the most impactful courses in their educational or professional careers, the MOOC offers an introduction to the sociopolitical issues in Northern Québec, the ancestral territory of many Indigenous nations. Under the direction of professor Thierry Rodon of Université Laval's Department of Political Science, the online course is available free of charge to anyone with an interest in Northern Québec seeking to learn more about the territory, its history, its societies, and its challenges.

Did you know?

> As a way of introducing next-generation scientists to the North, many INQ-affiliated researchers require the students they supervise to sign up for the *Northern Québec MOOC* before beginning their research project.

> Over 12,000 people have registered for the MOOC since it was launched in 2017. INQ is proud to contribute to raising awareness and furthering the education of people seeking to learn more about Northern Québec.

Source/Pierre Coupel

AN ENGAGED COMMUNITY

Thw INQ community includes representatives from 16 post-secondary institutions. Following is a profile of each of these renowned universities and their complementary strengths, teams, and expertise.
This network of dedicated actors committed to the sustainable and ethical development of northern regions helps bolster the quality and scope of our actions.

THE INQ COMMUNITY

REGULAR MEMBERS	AFFILIATED RESEARCHERS	AFFILIATED CENTRES	AFFILIATED CHAIRS
École de technologie supérieure	3	2	–
École nationale d'administration publique	2	2	0
Institut national de la recherche scientifique	19	3	4
Polytechnique Montréal	8	2	1
Concordia University	2	-	-
Université de Montréal	10	8	2
Université de Sherbrooke	13	8	3
Université du Québec network	–	–	–
Université du Québec à Chicoutimi	17	10	9
Université du Québec à Montréal	11	8	2
Université du Québec à Rimouski	22	5	8
Université du Québec à Trois-Rivières	7	1	–
Université du Québec en Abitibi-Témiscamingue	3	1	–
Université Laval	73	11	23
McGill University	69	32	14
Université TÉLUQ	–	–	–
TOTAL	**259**	**93**	**66**

AFFILIATION OF ASSOCIATED RESEARCHERS
Laurentian University
University of Ottawa
University of New Brunswick
Trent University

REGULAR MEMBERS

INQ regular members consist of Québec institutes of higher learning or legal entities that conduct research related to northern or Arctic issues.

ÉCOLE DE TECHNOLOGIE SUPÉRIEURE

ÉTS researchers are contributing to the sustainable development of the North by focusing their efforts on the impacts of climate change on the hydrology of northern regions and on the energy sector, specifically on dielectric materials and the effect of aging insulating systems used in electrotechnics.

ÉCOLE NATIONALE D'ADMINISTRATION PUBLIQUE

The researchers at ÉNAP with a focus on the North stand out for the remarkable quality and complementarity of their work. Some are looking at matters of governance and diplomacy specific to Indigenous communities as reflected in the political discourse and on social media. Others are more focused on government and political science, including analysis of the factors contributing to both conflict and cooperation among States; nordicity as a component of identity in Canada and Québec; and the role of the Canadian Armed Forces in delivering government services in the North.

INSTITUT NATIONAL DE LA RECHERCHE SCIENTIFIQUE

Three of the four centres that make up INRS are more actively involved in INQ'S activities. Centre Eau Terre Envrionnement is devoted to Québec's sustainable development in hydrology, aquatic biochemistry, earth sciences, sanitation, and reclamation. Centre Armand-Frappier Santé Biotechnologie develops unique expertise in the areas of sustainable human, animal, and environmental health, specifically in environmental biotechnologies and toxicology. Centre Urbanisation Culture Société, through the DIALOG network and the ODENA alliance, provides leadership in the field of Indigenous studies; supports the social, economic, political, and cultural development of Indigenous peoples; and offers an innovative space for dialogue between First Peoples and the university community.

POLYTECHNIQUE MONTRÉAL

Polytechnique Montréal contributes to the development of the North and northern communities, notably through its engineering research and training. Dams and infrastructure, glaciology, geotechnics and permafrost, environmental engineering, structural geology, hydrology of cold regions, water quality modelling, geothermal energy, mining exploration and operations, rare earths… these are just some of the areas of specialization in which researchers at the Polytechnique bring their unique expertise to INQ's work. Not only do they contribute to knowledge, but also to adapting civil and industrial infrastructure to the impact of climate change and to the transition to a more sustainable society.

CONCORDIA UNIVERSITY

Concordia University is active in the field of renewable energies. A technical and economic feasibility study on the potential for geothermal systems in Nunavik is underway, with a view to improving access to cleaner energy for remote communities in Nunavik.

UNIVERSITÉ DE MONTRÉAL

Université de Montréal is a catalyst for interdisciplinary and inter-institutional initiatives in both animal health and climate science. The university is a pioneer in northern arts studies and in research into the rights of First Peoples and is at the vanguard on issues relating to territory and societies. Its numerous innovation labs are currently hard at work on incorporating research knowledge related to experience, memory, culture, heritage, and narratives. The university is also striving to improve the integration of First Nations and Inuit peoples into the university community. With a view to reconciliation, it is seeking to highlight their philosophies and cultures.

UNIVERSITÉ DE SHERBROOKE

Researchers at Université de Sherbrooke are working on the characterization of water and snow in the North. They also specialize in remote sensing and geographic information systems (GIS), and are studying the complex relationships between human activity, climate change, and natural risks in the North.

UNIVERSITÉ DU QUÉBEC NETWORK

The member institutions of the Université du Québec network are conducting a wide range of teaching, research, and creation and community services. These activities are carried out in close cooperation with actors and communities in Northern Québec. The UQ member institutions are engaged in several fields, including the health and development of Indigenous communities; traditional knowledge; the promotion and sustainable use of natural resources; ecosystem conservation, and climate change. The team at Université du Québec actively supports initiatives put forth by the institutions and their partners, and fosters collaboration to develop relevant, innovative, and communal solutions to the major challenges affecting the future of northern populations and these territories.

UNIVERSITÉ DU QUÉBEC À RIMOUSKI

UQAR is home to a diverse group of researchers who focus on northern environments from an interdisciplinary perspective. These researchers are spread across several research units, including Institut des sciences de la mer de Rimouski, Groupe de recherche sur les environnements nordiques BORÉAS, the four Canada Research Chairs studying northern biodiversity, the integrative biology of northern flora, the geochemistry of coastal ecosystems, and marine geology, as well as the Research Chair in coastal geosciences. UQAR is partnered with the Uapishka Station and is actively involved in developing its research potential.

UNIVERSITÉ LAVAL

A pioneer for over half a century in northern and Arctic research, Université Laval is home to several major inter-university research centres, including Centre d'études nordiques (CEN), Québec Océan (QO), and Centre interuniversitaire d'études en recherches autochtones (CIÉRA). It heads up the Sentinel North research program and also houses Institut nordique du Québec and ArcticNet, three front-line northern research initiatives. Université Laval also hosts the CCGS *Amundsen* icebreaker, a state-of-the-art research ship deployed to the Arctic Ocean, as well as Takuvik, an international joint laboratory devoted to remote sensing of Canada's new Arctic frontier.

UNIVERSITÉ DU QUÉBEC À CHICOUTIMI

UQAC boasts expertise in regional initiatives, including in land planning and use, history and archaeology, economy of the North, and eco-consulting. UQAC has also made a name for itself in risk management in remote areas (for tourism engineering or development), and safe implementation of tourism, educational, industrial, or scientific outdoor activities.

UNIVERSITÉ DU QUÉBEC À TROIS-RIVIÈRES

UQTR boasts a dynamic environmental science department, and is innovative in research on tourism, economics, engineering, and health sciences. Its researchers have developed an interdisciplinary approach to help understand the transformations experienced by northern ecosystems and the cryosphere. Experts in psychoeducation are helping improve services to the Inuit, while UQTR-trained midwives are assisting in childbirth in Nunavik and playing a vital role in the communities there.

McGILL UNIVERSITY

McGill University is the instigator behind the Centre for Indigenous People's Nutrition and Environment, the Centre for Indigenous Conservation and Development Alternatives, the Quebec Centre for Biodiversity Science, the McGill Arctic Research Station, and the McGill Institute for the Study of Canada. RUIS McGill (integrated university healthcare network) is responsible for a territory stretching from Montréal to Nunavik. The mission of the RUIS network is to provide Quebecers with improved access to healthcare, and RUIS McGill's territorial responsibility includes facilitating the delivery of care to the inhabitants of Nunavik, along with teaching, research, and the evaluation of healthcare technologies.

UNIVERSITÉ DU QUÉBEC À MONTRÉAL

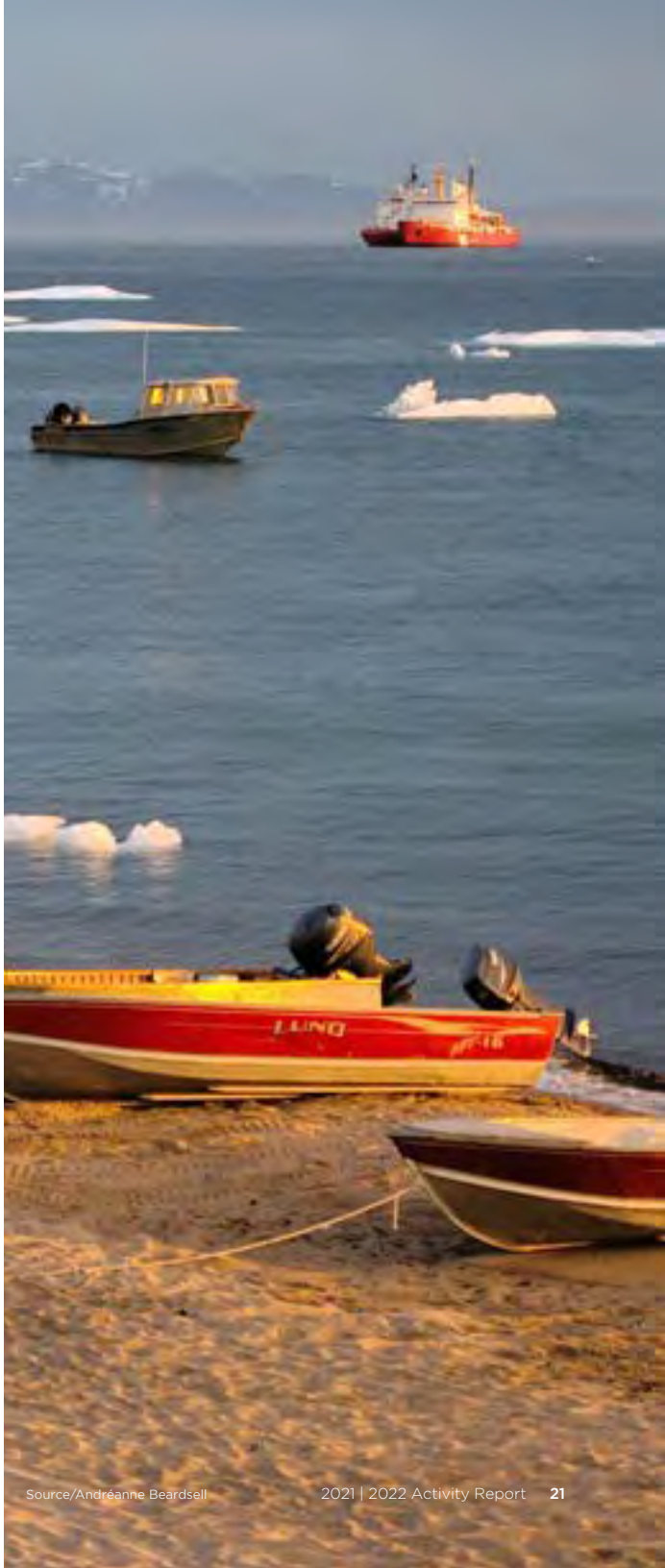
At UQAM, 14 departments work in the North and the Arctic. The training activities dedicated specifically to the North are divided into many disciplines: history, politics, tourism, literature, the arts, religious sciences, linguistics, and sociology. UQAM researchers collaborate with Indigenous communities on projects to analyze social, cultural, economic, and environmental issues related to the North and to winter. The UQAM Northern and Arctic Research Portal chronicles the research and training activities related to the North and the Arctic that are carried out or organized at UQAM. It also aims to strengthen ties between researchers from different disciplines and promote the development of multisectoral training activities.

UNIVERSITÉ DU QUÉBEC EN ABITIBI-TÉMISCAMINGUE

From the study of hydrogeological dynamics of the aquifers north of the 49th parallel to an analysis of the impact of mining sites on northern biodiversity and the development of research ethics best practices in an Indigenous context, UQAT has positioned itself as a leader in participative research with First Peoples. UQAT researchers also have a strong and recognized expertise in forestry. UQAT hosts Institut de recherche sur les forêts (IRF), whose mission is to contribute to the maintenance of forest ecosystem services. It does so through an interdisciplinary approach to research and training, and the dissemination and integration of new knowledge among the territory's many users.

UNIVERSITÉ TÉLUQ

With an outlook that's open to the world, Université TÉLUQ encourages and promotes learning at all stages of life, and helps develop knowledge by offering a vast selection of online programs and courses available from anywhere in the world. Its training offerings are innovative and stimulating, both in terms of their content and their pedagogical approach. Université TÉLUQ's teaching staff is devoted to developing new knowledge, high-level research, and educational innovations.



Source/Andréanne Beardsell

LEADING RESEARCH CENTRES

INQ's affiliated research entities provide varied and high-level expertise. They generate new knowledge and contribute significantly to INQ's mission. Following is a brief description of three of the 89 INQ-affiliated research entities at the heart of leading-edge northern research:

GROUPE DE RECHERCHE EN ÉPIDÉMIOLOGIE DES ZOONOSES ET SANTÉ PUBLIQUE (GREZOSP) – UDEM

GREZOSP is a group of scientists and organizations whose mission is to promote research on public and animal health challenges in order to guide community actions and public policy. GREZOSP is a reference centre for epidemiological methods and the One-health approach to improve health at the human-animal-environment interface, in Canada and around the world. Due to the close relationship Indigenous communities have with dogs, a number of the research group's projects are studying the challenges related to the human-dog interface in certain communities in Nunavik.

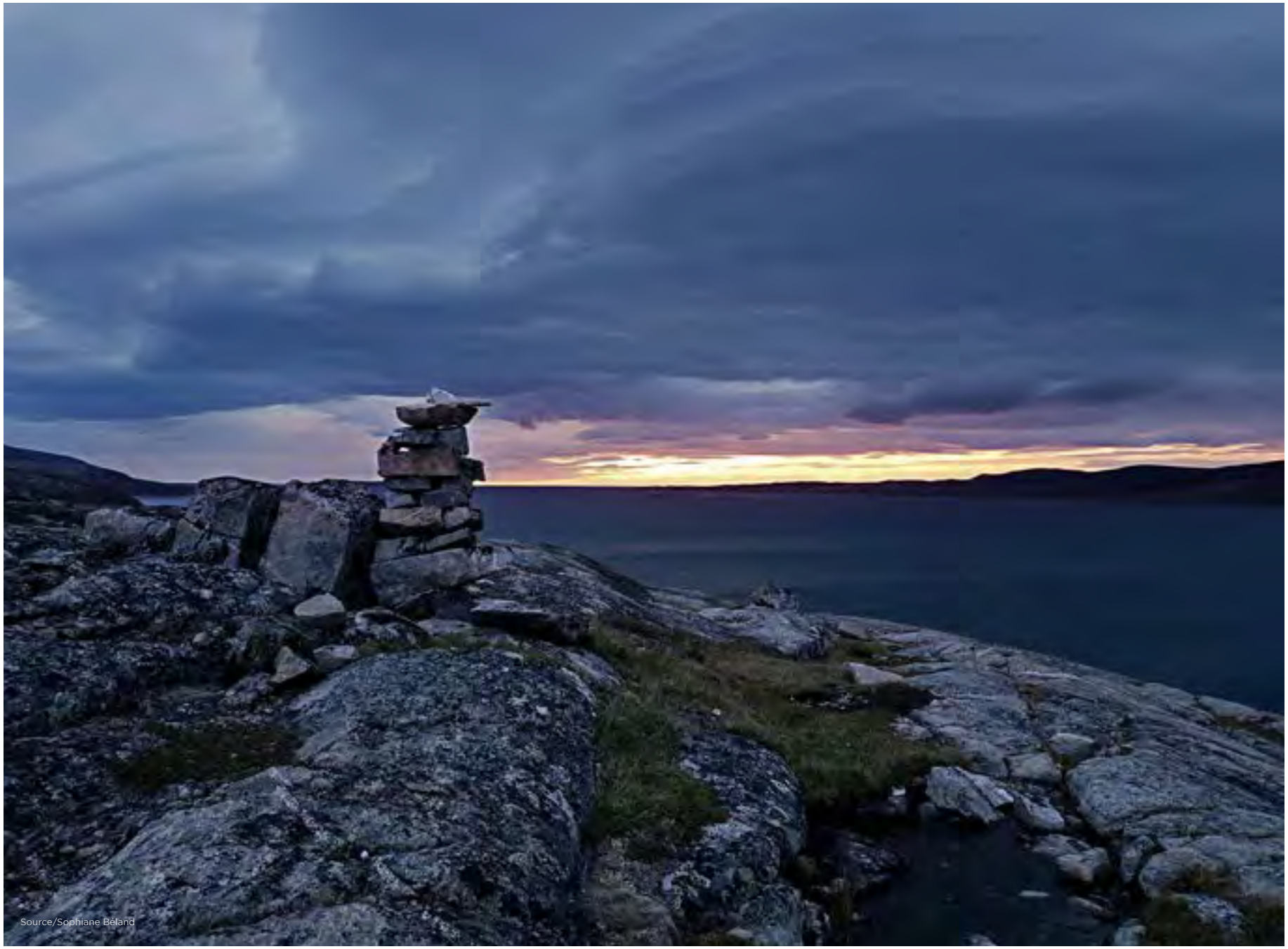
Check out the webinar Humans and Dogs in Northern Québec presented as part of the INQ webinar series by GREZOSP members Cécile Aenishaenslin and Léa Delesalle, who are also members of the Faculty of Veterinary Medicine at Université de Montréal.

QUÉBEC CENTRE FOR RESEARCH IN ECOTOXICOLOGY (ECOTOQ) – INRS

EcotoQ's mission is to document the current and potential presence of various contaminants in the environment (water, air, soil, biota), and their effects on flora and fauna. This centre, the only one of its kind in Québec, is home to numerous scientists trained in environmental chemistry, biology, and environmental engineering who have an interest in various environments, including Northern Québec and the Canadian Arctic.

INTERDISCIPLINARY RESEARCH LABORATORY IN LIFE CYCLE ASSESSMENT AND CIRCULAR ECONOMY (LIRIDE) – UDES

Founded in 2013, LIRIDE explores life cycle assessment, the circular economy, and ecodesign. Renowned for its scientific research, it also provides assistance to industry, small businesses, and organizations seeking to adopt better practices supported by life cycle assessments. LIRIDE is currently conducting research to develop a new environmental impact assessment method specific to Nunavik. By the end of the study, the researchers believe the method will be able to be used to analyze different options for energy production in the North.



Source/Sophiane Béland

INQ-AFFILIATED SCIENTISTS

More than 250 INQ-affiliated researchers are shaping northern research throughout the province. Below is a snapshot of three seasoned scientists:

MICHELLE GARNEAU – UQAM

Michelle Garneau holds bachelor's and master's degrees in physical geography from Université Laval. She completed her PhD in paleoecology at the department of biology at the University of Amsterdam. Garneau worked as a researcher for nearly 10 years at the Geological Survey of Canada, where she coordinated paleoecology/paleoclimatology work at the High Arctic Climate Change Observatory on Ellesmere Island. She joined UQAM in 2001 as a professor at the university's department of geography. Michelle Garneau is a regular member of Geotop and GRIL, and an associate member of Centre d'études nordiques, three strategic FRQNT groups affiliated with INQ.

She is involved in several national and international research projects linking aspects of the dynamics of peat bogs, carbon, and climate in boreal and sub-Arctic biomes. Since arriving at UQAM, Garneau has supervised more than 50 master's students and over 20 doctoral students and post-doctoral fellows, and has published upwards of 150 scientific articles. On two occasions she has served on IPCC's committees for Guidelines for National Greenhouse Gas Inventories.

STÉPHANE ROUSSEL – ENAP

Stéphane Roussel is a full professor at École nationale d'administration publique (ENAP). He earned a PhD in political science from Université de Montréal in 1999. From 2002 to 2012 he was a professor with the department of political science at Université du Québec à Montréal, where he held the Canada Research Chair on Canadian Foreign and Defence Policy.

Roussel chaired the Canada section of the International Studies Association in 2004-2005 and Société québécoise de Science politique (SQSP) in 2010-2011. He works with various departments and units of the Canadian Armed Forces, including the Canadian Forces College in Toronto, the Second Canadian Division, and the Régiment de Maisonneuve.

His research deals primarily with Canadian security policy, notably with regard to the Arctic, and to relations with the United States and European countries. He heads up a research program on the emergence of new international security challenges in the Arctic.

Check out the webinar Diplomacy beyond sovereign states: The state of play of Arctic paradiplomacy available as part of the INQ webinar series by professors Stéphane Roussel (ENAP), Mathieu Landriault (uOttawa), and Jean-François Payette (UQAM).

ANNIE DESROCHERS – UQAT

Annie Desrochers is a professor and director of the PhD program in environmental science at UQAT. She also holds the NSERC Industrial Chair in Silviculture and Wood Production. Desrochers holds a bachelor's degree in biology, a master's in forest ecology, a PhD in forest biology and management, and a post-doc in intensive silviculture, which she earned in Alberta in 2002.

Her research interests are primarily in the development of silvicultural techniques for fast-growing plantations in boreal regions. She is also interested in the study of root system links in boreal forest stands as well as the effect of those links on the dynamics of forest stands.

In January 2011, Desrochers's work on root grafts was ranked as one of the top ten scientific discoveries of the year, according to the magazine Québec Science, and won the People's Choice award.

Check out the webinar by Professor Annie Desrochers entitled Root grafting in balsam fir available as part of the INQ webinar series.

Source/Véronique Dubos

UP-AND-COMING SCIENTISTS DEEPLY ATTACHED TO THE NORTH AND TO THE COMMUNITIES LIVING THERE

As you can see in this report, the next generation of scientists are at the heart of many of INQ's actions. Training them, providing them providing them with opportunities to put into practice what they've learned, while offering them an informed and evolving frame of reference, are just a few examples of this. This special connection with young people is also a source of inspiration. With their open-mindedness, their ingenuity, and their commitment to do things right, the future is looking bright indeed for northern research in Québec. Here is a snapshot of two students who are helping advance knowledge in their respective fields:

EDGAR SERGUES, PHD STUDENT IN CIVIL ENGINEERING AT UNIVERSITÉ DE SHERBROOKE

A member of the Interdisciplinary Research Laboratory in Life Cycle Assessment and Circular Economy (LIRIDE), Edgar Sergues is working to develop knowledge in environmental impact assessment for Nunavik. Sergues is currently a doctoral candidate. Although he worked as an engineer for a number of years, he felt that environmental challenges were too often being overlooked in the industrial sector, and decided to turn his attention to research. Edgar Sergues has a strong interest in the distinctiveness of the North, in terms of society and the environment, and is keenly aware of Nunavik's challenges and opportunities. That is why he chose to work on the creation of sustainable development decision aids for these regions.

SABRINA BOURGEOIS, PHD STUDENT IN POLITICAL SCIENCE AT UNIVERSITÉ LAVAL

Sabrina Bourgeois holds a master's degree in political science from Université Laval. Since 2015, she has been involved in research projects and scientific activities with the INQ Research Chair on Northern Sustainable Development and with Centre interuniversitaire d'études et de recherches autochtones (CIÉRA). Her research deals specifically with decolonization, Indigenous policies, self-determination, and the management of natural resources.

Her thesis on Indigenous Peoples and mining development entitled *Négocier les règles du jeu. Les peuples autochtones et le développement minier* is in keeping with the international Knowledge Network on Mining Encounters and Indigenous Sustainable Livelihoods: Cross-Perspectives from the Circumpolar North and Melanesia/Australia (MinErAL). By comparing Canada and New Caledonia, her research project explores how different legal and political contexts shape relations between local communities, in particular peoples in the process of decolonization, and Indigenous Peoples, the State, and mining companies.

FOUR COMMITTEES AND ONE WORKING GROUP FOCUSED ON FIVE PRIORITY ISSUES

The committees and working group are made up of INQ-affiliated scientists, partners from the public and private sectors, and northern partners. Composed of individuals from different backgrounds and complementary areas of expertise, these teams reflect on and propose measures, tools, or activities to fuel reflection and spur the engagement of the INQ community around priority issues in northern and Arctic regions. The committees are permanent structures within INQ, while working groups are formed on an ad hoc basis and are eventually disbanded, in keeping with the research needs expressed by our northern partners.

Every year, INQ's groups and committees attract new talent. In 2021-2022, 18 new people joined the various committees.

WORKING GROUP ON NEW AND RENEWABLE ENERGIES

This group is actively seeking alternatives to the use of fossil fuels in the North, a source of energy with a negative impact on the ecological footprint of northern regions. The costs associated with the fuel itself, and its transport, also place an economic burden on the regions. In addition, the working group is looking at several other options to meet the energy needs of Québec's remote regions—all of them focused on new and renewable energy—in order to bolster the energy transition essential to the sustainable development of Northern Québec.

Main achievements in 2021-2022

Organization of a seminar entitled *Sustainable energy production and use in the North: observations, solutions, issues and challenges for all disciplines* during the 89th Acfas Conference. The project was headed by researcher Louis Gosselin.

The INQ committee and team also contributed to the documentary project by researcher Christophe Krolik on energy efficiency standards for dwellings in Nunavik and on Inuit preferences for housing. The video will be made public in late 2022.

Leader

Jasmin Raymond
Institut national de la recherche scientifique (INRS)

Members

Morad Abdelaziz
Université Laval (ULaval)

Kodjo Agbossou
Université du Québec à Trois-Rivières (UQTR)

Olivier Arsenault
Hydro-Québec

Karim Belmokhtar
Nergica

Jeff Bergthorson
McGill University

Myriam Blais
Société du Plan Nord (SPN)

Francois Bouffard
McGill University

Martin Bourbonnais
Cégep de Jonquière

Marie-Pier Breton
Société d'habitation du Québec (SHQ)

Pierre Brisson
Transition énergétique Québec (TEQ)

Christian Carrier
Carboniq

Marilys Clement
Nergica

Jérôme Cros
ULaval

Marie-Ève Dupont
Institut de recherche d'Hydro-Québec (IREQ)

Guy Dumas
ULaval

Alain Forcione
IREQ

Richard Gagnon
TEQ

Véronique Gilbert
Kativik Regional Government

Nicolo Giordano
INRS

Louis Gosselin
ULaval

Jean-François Gravel
Ministère des Affaires municipales et de l'Habitation (MAMH)

Didier Haillot
École de technologie supérieure (ÉTS)

Innocent Kamwa
ULaval

Christophe Krolik
ULaval

Patrick Labbé
Hydro-Québec

Joë Lance
Les Énergies Tarquti

Rachid Laouamer
IREQ

Daniel Martineau
Natural Resources Canada

Félix Ménard-Saint-Denis
SHQ

Alexandre Myre
Englobe

Fuzhan Narsiri
Concordia University

Mathieu Olivier
ULaval

Taha Ouarda
INRS

Simon Paradis
Nergica

Mélanie Paul
Inukshuk Synergie

Mathieu Payeur
TEQ

Julia Purdy
Natural Resources Canada

Marc-André Richard
IREQ

Laurie-Ann Rioux
SPN

Jean Rouleau
ULaval

Meli Stylianou
CanmetENERGY – Varennes

Gildas Tapsoba
Cégep de Jonquière

Marie Towo
SPN

Éric Vandal
Cégep de Jonquière

Coordinator

Debra Christiansen-Stowe
INQ

INFRASTRUCTURE COMMITTEE

This committee manages and optimizes the shared use of INQ's research infrastructure, in cooperation with the members and partners who possess the infrastructure. It makes recommendations to the Science and Development Committee with regard to the funding, deployment, and sharing of research infrastructure. It also works to promote research infrastructure, ensure its upkeep, and establish rules for the use of such infrastructure by researchers.

Main achievements in 2021-2022

Promotion of leading-edge equipment at Lab-O-Nord in INQ's monthly newsletter

The committee approached new infrastructure managers from INQ member universities in order to incorporate their labs and equipment into the Lab-O-Nord platform.

Leader
Keith Lévesque
Sentinel North

Members
Nathalie Foisset
McGill University

Alexandre Forest
Amundsen Science

Marie-Hélène Forget
Takuvik

Mickaël Lemay
Centre d'études nordiques

Luc Michaud
Amundsen Science

Stéphane Prémont
Institut national de la recherche scientifique

Brigitte Robineau
Québec-Océan

Jean-Marie Trudeau
SN

Coordinator
Debra Christiansen-Stowe
INQ

Pierre-Yves Savard
INQ

Lab-O-Nord | An increasingly popular tool

Between March 31, 2021, and April 1, 2022, the Lab-O-Nord platform had 5,295 visits. That is a nearly 58% increase over the previous year.

TRAINING COMMITTEE

The committee has five main objectives: Make an inventory of existing training programs on Northern Québec at the founding partner universities; support universities in their initiatives to train students, future stakeholders in the North, and professionals working on northern issues; develop an uncredited continuing education program for transferring knowledge to academics, professionals, and the general population; offer an uncredited general training program on Northern Québec in the form of a nanoprogram; and encourage the involvement of Indigenous people in all aspects of and at all levels of their educational program.

Main achievement in 2021-2022

Design and development of the second edition of *Introduction to Northern Research and Issues*. This immersive training is aimed at researchers just starting out in their careers. The 2022 edition dealt specifically with mobilizing and sharing knowledge.

Co-chairs
Catherine Girard
Université du Québec à Chicoutimi

Thierry Rodon
ULaval

Members
Marie Audette
ULaval

Brigitte Bigué
INQ

Marie-France Gévry
Sentinel North

Caroline Hervé
ULaval

Jim Howden
McGill University

Martine Lizotte
ArcticNet

Marie-Éve Marchand
ULaval

Loretta Robinson
First Nations Education Council

Coordinator
Debra Christiansen-Stowe
INQ

Pierre-Yves Savard
INQ

SUSTAINABLE DEVELOPMENT COMMITTEE

The committee draws on the United Nations' Sustainable Development Goals (SDGs) and validates those that are relevant for the North within INQ, while developing appropriate indicators and putting together a sustainable development toolbox for northern research.

Main achievement in 2021-2022
Evaluation of five projects funded under the INQ/SN call for projects in relation to selected criteria from the United Nations Sustainable Development Goals.

Leader
Murray Humphries
McGill University

Members
Étienne Berthold
Institut en environnement, développement et société (Institut EDS)

Jasmin Raymond
INRS

Thierry Rodon
ULaval

Coordinator
Debra Christiansen-Stowe
INQ

FIRST PEOPLES COMMITTEE

This committee provides input to the Science and Development Committee with regard to the needs and aspirations of the First Peoples within INQ. The First Peoples Committee names a chair, whose three-year term is renewable.

Main achievement in 2021-2022
Participation in the organization and hosting of the 2021 National Building Reconciliation Forum: Falling into step with First Peoples students, during which INQ's research guidelines were promoted.

Participation in the organization of Expo Sciences Autochtone Québec (Indigenous Science Fair) 2022, hosted by Université Laval.

Leader
Melissa Saganash
Representative of the Cree Nation

Serge Ashini Goupil
Innu representative

Ellen Avard
Representative of the Inuit of Nunavik and the Nunavik Research Centre

Najat Bhiry
Centre d'études nordiques

Kakwiranoron Cook
McGill University

Mark O'Connor
Makivik Corporation

Glenda Sandy
Representative of the Naskapi Nation of Kawawachikamach

Michel J. Tremblay
ULaval

Coordinator
Debra Christiansen-Stowe
INQ

RESEARCH AT THE PRIORITIES

PRIORITY 1

SOCIETIES AND CULTURES

Improve our knowledge of social and cultural issues of Northern Québec by studying different development models as well as heritage, identities, territoriality, knowledge, living environments, and governance. This priority also emphasizes the planning of research agendas, compliance with ethics protocols in Indigenous settings, and the decolonization of research.

Co-directors

Thierry Rodon
Associate Professor
Department of Political Science
Université Laval

Daniel Chartier
Full Professor
Department of Literary Studies
Université du Québec à Montréal

PRIORITY 2

HEALTH

In keeping with the themes and priorities identified by people in the North, and using a partnership approach, this priority focuses not only on research into illness and disease, but also on resilience, adaptation, and the positive aspects of health. Intervention research, both clinical and population-based, aims to identify optimal solutions and best practices to improve the health of northern populations and reduce health-related inequities.

Co-directors

Mélanie Lemire
Associate Professor
Department of Social
and Preventive Medicine
Université Laval

Cathy Vaillancourt
Full Professor
Centre Armand-Frappier
Santé Biotechnologie
INRS

PRIORITY 3

ECOSYSTEM FUNCTIONING AND ENVIRONMENTAL PROTECTION

The ecosystems of high northern latitudes are feeling the combined effect of accelerated socio-oeconomic development, strong demographic growth, and global warming. This priority examines the consequences of such stresses on marine, terrestrial, and freshwater ecosystems with a view to preserving and protecting food security and the well-being of people living in the North. This research priority explores global warming, thaw, freshwater, food security, and the greenhouse effect, with an emphasis on coastal environments.

Co-directors

Philippe Archambault
Full Professor
Department of Biology
Université Laval

Esther Lévesque
Full Professor
Department of Environmental Science
Université du Québec à Trois-Rivières

PRIORITY 4

INFRASTRUCTURE AND TECHNOLOGY

Developing Northern Québec requires new technologies and infrastructure adapted to its harsh environment characterized by a cold climate, remote communities, and melting permafrost. To address the needs of northern communities, this priority explores issues including the rapid implementation of telecommunications channels, development of environmental technologies to ensure the protection of potable water supplies of northern communities, the development of infrastructure adapted to harsh environments, and the conversion and management of waste from a health and sustainable development standpoint.

Co-directors

Louis-César Pasquier
Associate Professor
Centre Eau, Terre, Environnement
INRS

Abdellah Chehri
Professor
Department of Applied Sciences
Université du Québec à Chicoutimi

PRIORITY 5

NATURAL RESOURCES

The North's ecosystems are home to considerable forestry, mineral, hydroelectric, and wind resources. This priority looks at the economic value of natural resources while taking into account the extreme vulnerability of northern ecosystems to climate change and the impact of human activity. In keeping with the aspirations of northern communities, it studies and documents overexploitation, seeks to achieve social acceptability, and encourages the local spinoffs of economic activity. Through optimization and planning, this priority seeks to develop tools that will ensure that strategic resources in the North are developed in a sustainable manner.

Co-directors

Annie Desrochers
Full Professor
Université du Québec
en Abitibi-Témiscamingue
Amos Campus

René Therrien
Professor
Department of Geology
and Geological Engineering
Université Laval

Source/Andréanne Beardsell

Source/Manuelle Landry-Cuerrier

RESEARCH CONDUCTED BY INQ CHAIRS

The INQ Research Chairs are devoted to wildlife conservation, food security, the production of renewable energy in a northern context, and sustainable development of the North. All three Chairs are in their fifth year of funding by INQ.

In 2021-2022, INQ received an additional, non-recurring funding in the amount of $150,000 from Fonds de recherche du Québec. This amount was invested in the three INQ Chairs, enabling them to carry out an additional project. Overview of the activities conducted by the INQ Chairs in the past year:

INQ McGILL CHAIR IN NORTHERN RESEARCH – WILDLIFE CONSERVATION AND TRADITIONAL FOOD SECURITY

Chairholder **Murray Humphries**, Associate Professor, Agricultural and Environmental Sciences Department, McGill University

The Chair focuses on the protection and sustainable development of Northern Québec's natural resources. Their research focuses on how resource development and other forms of environmental change impact the abundance and health of northern wildlife populations and their contribution to traditional food security. The Chair conducts its work in close collaboration with research partners in Northern Québec and elsewhere in Canada, including organizations involved in the study of fauna, climate change, Indigenous health and food security, the subsistence economy, regional governance, environmental protection, and sustainable development.

In the past year, the Chair's team continued its study on beaver expansion in Nunavik and its impact on the Arctic char population; the characterization and valorization of Indigenous food systems in Northern Québec; the quality of moose habitat under the adapted forest regime in Eeyou Istchee James Bay; coastal habitats and the ecology of polar bears in the Eeyou Marine Region; and the prospects for adaptation of Indigenous food systems in Northern Québec. These studies are part of a broader project entitled *Wildlife, Environmental Change, and Local Indigenous Food Systems (WECLIFS)*, and they deal with the impacts of environmental changes on local Indigenous food systems in Northern Québec. The Chair team is also involved in the *Canadian Mountain Network (CMN)*, a network of Canadian centres of excellence that brings together Indigenous organizations and communities, universities, governments, businesses, and the not-for-profit sector to support the resilience and health of mountain peoples and places in Canada. As part of one of CMN's seven knowledge hubs focusing on ecological change and livelihoods in the summer range of the Porcupine Caribou herd, the Chair recruited an Inuvialuit student to continue the study and monitoring of the muskox population on the Yukon North Slope. The team also helped implement a multidisciplinary project for the co-production of knowledge on Peary Caribou conservation in the Canadian Arctic. In addition, the Chair was involved in co-developing the Ărramăt Project (funded under the Exploration stream of the New Frontiers in Research Fund), consisting of an international team of Indigenous organizations, governments, university researchers, and other resources working together on research and action in support of the health and well-being of the environment and Indigenous communities around the world.

The Chair's notable achievements over the past year include the support, engagement, and participation of individuals, communities, and local and regional organizations throughout the research process; the dissemination of research updates and findings using various communication tools; as well as Indigenous capacity building through training activities with community members.

Source/Sophiane Béland

INQ RESEARCH CHAIR ON NORTHERN SUSTAINABLE DEVELOPMENT

Chairholder Thierry Rodon, Associate Professor, Department of Political Science, Université Laval

The main objective of the Chair is to analyze and define development models based on the specific needs of the North and meet the imperatives for sustainable development in a northern context. Over the past year, the chairholder and his team have focused their work on developing research and partnerships within the Knowledge Network on Mining Encounters and Indigenous Sustainable Livelihood (MinErAL). The Realizing Indigenous Rights: Effective Implementation of Impact and Benefit Agreements (IBA) project is ongoing, and the collaborative agreement with the community of Matimekush-Lac John, which is involved in the project, has been signed. The team also worked on a project on implementing free, prior, and informed consent, from a comparative perspective.

In addition, the chairholder is a co-investigator on the SSHRC project on treaty implementation, and he also co-directs the research priority on evaluating the well-being of individuals and communities in the wake of treaty signings. He is also interested in disputes that arise when treaties are implemented.

The Chair team continued its collaboration with the INQ Northern Geothermal Potential Research Chair to identify the incentives and obstacles to renewable energy projects in the Arctic. On another note, the team worked on updating the Nordicity Indices developed by Louis-Edmond Hamelin. An interactive map was created and will be published in the coming year. The updated Nordicity Indices will provide a tool to better define Northern Québec and the Canadian North, and to review their natural, social, cultural, and economic characteristics.

INQ NORTHERN GEOTHERMAL POTENTIAL RESEARCH CHAIR

Chairholder **Jasmin Raymond**, Professor,
Centre Eau Terre Environnement, INRS

The scientific objective of this Chair is to improve the understanding of heat transfer processes that define the extent, sustainability, and feasibility of geothermal resource development in Northern Québec. The Chair also aims to raise awareness among northern communities and companies to improve knowledge related to the development of geothermal and energy efficiency projects in Northern Québec.

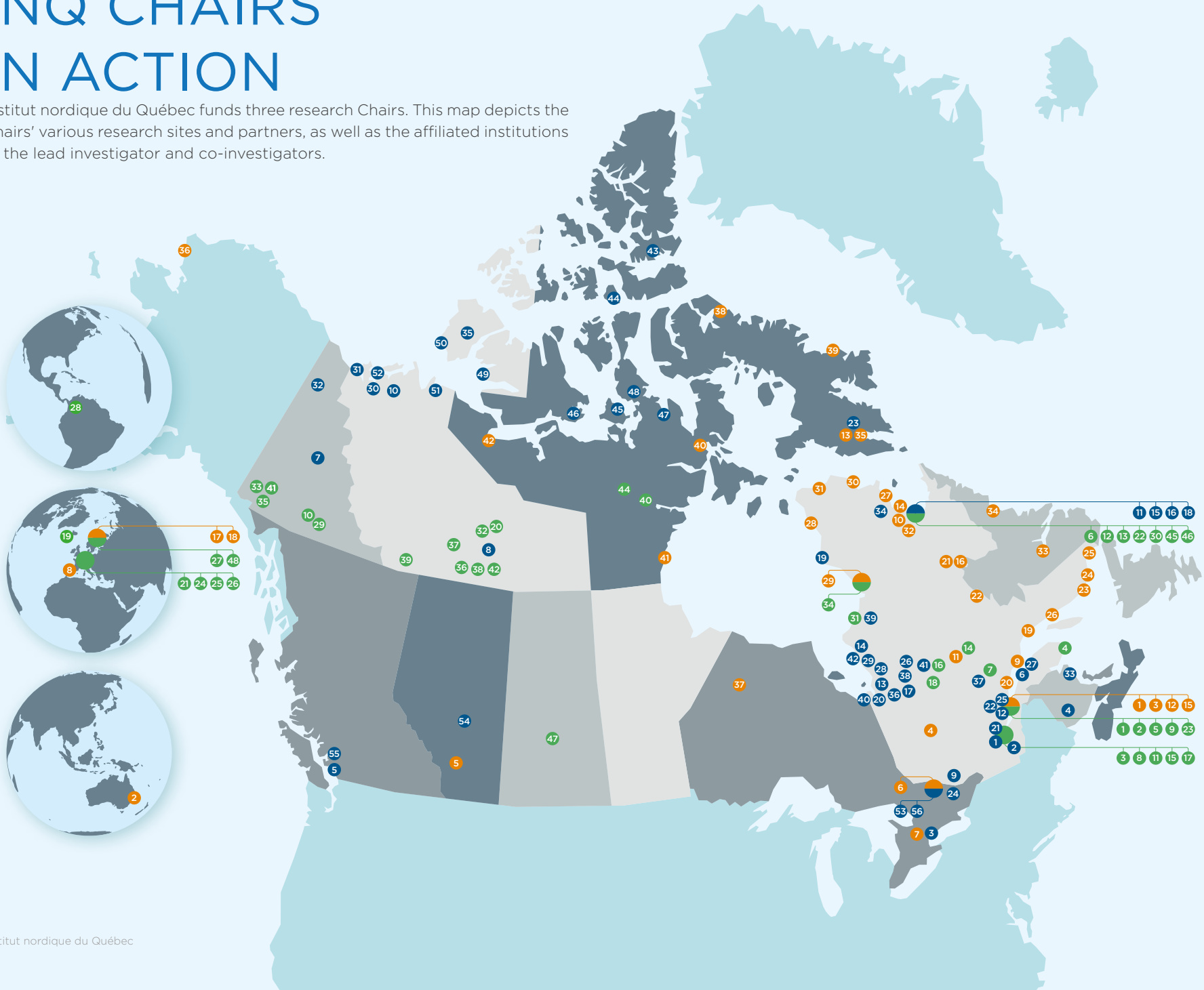
Over the years, the Chair has helped train a critical mass of students whose project findings indicate that it would be more economically viable and less damaging to the environment to heat buildings in the North with geothermal energy rather than with diesel. Their research marks a turning point, with the development of small-scale real systems to demonstrate that geothermal energy could be harnessed on a larger scale for the benefit of northern communities. The next research stage will require major efforts to expand the demonstration projects to more communities, or to increase the size of the systems to demonstrate viability on a larger scale.

In just a few years, the Chair's work has led to major scientific breakthroughs, from mathematical proof of concept to the installation of a real geothermal system—no easy feat in a northern context. Even more promising results are expected with the operation of the geothermal system for the Kuujjuaq community pool and the collection of actual data.

Lastly, with the help of INQ and with a Dialogue grant obtained by the chairholder from FRQNT, the Chair team was able to produce two videos. The first deals with renewable energy in Nunavik, while the second looks specifically at geothermal energy. The videos will be shown during visits to the communities and will be included in the Collaborative Northern Lexicon on the INQ website.

INQ CHAIRS IN ACTION

Institut nordique du Québec funds three research Chairs. This map depicts the Chairs' various research sites and partners, as well as the affiliated institutions of the lead investigator and co-investigators.



McGill/INQ Chair in Northern Research – Wildlife Conservation and Traditional Food Security

1	McGill University
2	Université de Sherbrooke
3	University of Toronto
4	University of New Brunswick
5	University of British Columbia
6	Université du Québec à Rimouski (UQAR)
7	Yukon Territorial Government
8	Govnernment of Northwest Territories
9	Parks Canada
10	Gwich'in Renewable Resources Board (GRRB)
11	Makivik Corporation
12	Ministère des Forêts, de la Faune et des Parcs
13	Cree Trappers Association
14	Cree Board of Health and Social Services of James Bay
15	Nunavik Regional Board of Health and Social Services
16	Regional Nunavimmi Umajulivijiit Katujaqatigininga (RNUK)
17	Cree Nation Government
18	Kativik Regional Government
19	Nunavik Marine Region Wildlife Board
20	Eeyou Marine Region Wildlife Board
21	Ouranos
22	Environment and Climate Change Canada
23	Nunavut Tunngavik Inc.
24	Inuit Tapiriit Kanatami
25	Cree-Québec Forestry Board
26	Niskamoon Corporation
27	Institut des sciences de la mer de Rimouski (ISMER)
28	Eastmain
29	Wemindji
30	Aklavik
31	Mackenzie Delta
32	Old Crow Flats
33	Tabusintac Bay
34	Tasiujaq
35	Banks Island
36	Nemaska
37	Mistissini
38	Waswanipi
39	Whapmagoostui-Kuujjuarapik
40	Waskaganish
41	Oujé-Bougoumou
42	Chisasibi
43	Grise Fiord
44	Resolute Bay
45	Gjoa Haven
46	Cambridge Bay
47	Kugaaruk
48	Taloyoak
49	Ulukhaktok
50	Sachs Harbour
51	Paulatuk
52	Tuktoyaktuk
53	Carleton University
54	University Of Alberta
55	Simon Fraser University
56	University of Ottawa

INQ Northern Sustainable Development Research Chair

1	Université Laval
2	Griffith University
3	Institut national de la recherche scientifique (INRS)
4	Université du Québec en Abitibi-Témiscamingue, Val-d'Or Campus
5	University of Calgary
6	Carleton University
7	Wilfrid Laurier University
8	Université de Rouen Normandie
9	Regroupement des femmes de la Côte-Nord
10	Makivik Corporation
11	Comité condition féminine Baie-James
12	Crown–Indigenous Relations and Northern Affairs Canada
13	Qaujigiartiit Health Research Centre
14	Kativik Regional Government
15	Société du Plan Nord
16	Matimekush-Lac John Innu Nation Council
17	Luleå University of Technology
18	The Arctic University of Tromsø (UiT)
19	Sept-Îles
20	Sacré-Cœur
21	Schefferville and Matimekush-Lac John
22	Fermont
23	Chevery
24	La Tabatière
25	Rivière-Saint-Paul
26	Havre-Saint-Pierre
27	Kangirsuk
28	Akulivik
29	Umiujaq
30	Kangiqsujuaq
31	Salluit
32	Kuujjuaq
33	Happy Valley-Goose Bay
34	Nain
35	Iqaluit
36	Red Dog Mine
37	Kingfisher Lake
38	Pond Inlet
39	Qikiqtarjuaq
40	Naujaat
41	Arviat
42	Kugluktuk

INQ Northern Geothermal Potential Research Chair

1	Institut national de la recherche scientifique (INRS)
2	Université Laval
3	École de technologie supérieure ETS
4	Nergica
5	Transition énergétique Québec
6	Englobe – Nunatech
7	Cégep de Jonquière
8	Carboniq
9	Cima+
10	Yukon Geological Survey / H.S. Bostock Core Library
11	Institut de recherche d'Hydro-Québec (IREQ)
12	Kativik Regional Government
13	Nayumivik Landholding Corporation
14	Développement économique Chibougamau
15	Makivik Corporation
16	Ville de Chapais
17	Midland Exploration
18	Osisko Mine
19	University of Reykjavik
20	Northwest Territories Geological Survey
21	Turin Polytechnical School
22	Société Kuujjuamiut
23	Induktion Géothermie
24	Bureau de recherches géologiques et minières
25	Université de Rennes
26	University of Turin
27	KTH Royal Institute of Technology
28	University of Medellín
29	Takhini Hot Pools
30	Kuujjuaq
31	Whapmagoostui-Kuujjuarapik
32	Con Mine
33	Kluane Lake
34	Umiujaq
35	Burwash Landing
36	Hay River
37	Fort Providence
38	Enterprise
39	Fort Liard
40	Qamani'tuaq
41	Kluane First Nation
42	Northern Loco
43	Canmet ENERGY
44	Qulliq Energy Corporation
45	Société Kuujjuamiut Inc.
46	Avataa
47	RESPEC Consulting Inc.
48	Norwegian University of Science and Technology

LEGEND Principal investigator's institutional affiliation | ★ Co-investigators' institutional affiliation | Partner | Research site

RESEARCH PROJECTS
SET IN MOTION BY INQ AND ITS PARTNERS

In addition to its three Research Chairs, INQ also funds a number of research projects.

"RESEARCH PARTNERSHIP PROGRAM FOR A SUSTAINABLE NORTH" FUNDED BY INSTITUT NORDIQUE DU QUÉBEC (INQ) AND SENTINEL NORTH (SN)

The goal of the program, launched in 2019, is to enhance Québec's knowledge base about the North and the Arctic, in keeping with INQ's scientific program and SN's objectives, from a perspective of the sustainable development of Northern Québec and the well-being of the communities who live there. Seven projects are currently receiving funding under this INQ-SN program. The projects are listed below (pages 39 to 45).

CALL FOR PROJECTS IN PARTNERSHIP WITH RQM AND CEGRIM

In September 2021, Réseau Québec maritime (RQM), the Government of Québec's Centre d'expertise en gestion des risques d'incidents maritimes (CEGRIM), and Institut nordique du Québec launched a joint call for projects to members of INQ and RQM with a view to improving the emergency preparedness of communities in Nunavik in the event of a maritime incident.

With this call for projects, RQM, CEGRIM, and INQ seek to promote the development of avant-garde approaches rooted in intersectoral and interdisciplinary science as well as in local and Indigenous knowledge. The three entities also aim to encourage projects addressing three key themes for maritime incident management in the region of Kuujjuaq, in Nunavik:

> Coastal vulnerability (risks, exposure)

> Food security

> Local and Indigenous knowledge

> On September 2, 2021, an innovation workshop was held online. The goal was to inform the research community about the call for projects and create a consortium of researchers interested in working together with stakeholders on an innovative project addressing the combined issues of coastal vulnerability, food security, and local and Indigenous knowledge. Eighteen people attended the workshop.

Ultimately, the selected project was that of researcher David Didier of UQAR's Departemnt of Biology, Chemistry and Geography, and his co-investigator, Justine Gagnon (Departemnt of Geography, ULaval). Their project is number 8 on the list below (page 46).

1

DYNAMICS OF THE INNU ANCESTRAL TERRITORY (NITASSINAN) THROUGH THE MORPHO-SEDIMENTARY AND SOCIO-CULTURAL STUDY OF LAKE MANICOUAGAN (RESERVOIR)

PROJECT STARTED IN JULY 2020

Lead investigator: Patrick Lajeunesse (ULaval)

Co-applicants: Caroline Desbiens (ULaval), Pierre Francus (INRS) and Justine Gagnon (ULaval)

Students involved: two master's and one PhD student

Description

The research project aims to acquire knowledge about the ancestral Innu territory (Nitassinan) through a transdisciplinary study of an emblematic ecosystem in Northern Québec: the Manicouagan Reservoir, which is now part of a territory designated as a UNESCO Biosphere Reserve.

2021-2022 project highlights

The mission initially slated for Winter 2021 had to be cancelled due to the pandemic and to difficult weather conditions. However, in March 2022, the research team was able to visit the site and extracted over 20 core samples from the bottom of the Manicouagan Reservoir. The samples were collected at depths ranging from 140 to 440 metres. These depths reflect the original depth of the lake that was flooded when the Manic-5 dam was commissioned in the 1960s. Thanks to sedimentary archives, the research team will be able to plot the evolution of the ancestral land of the Innu over the course of several millennia, and survey the morphological and sedimentary impacts of the construction of the dam.

For more information: Manicouagan, Yesterday, Today, and Tomorrow

Source/Léo Chassiot

2

IMPACTS OF CLIMATE CHANGE AND BROWNING ON SALMONID OXYTHERMAL HABITAT AND GREENHOUSE GAS EMISSIONS IN ARCTIC REGIONS

PROJECT STARTED IN JULY 2020

Lead investigator: Isabelle Laurion (INRS)

Co-applicants: André St-Hilaire (INRS), Raoul-Marie Couture (ULaval) and Normand Bergeron (INRS)

Students involved: one master's and two PhD students

Description

The objective of this project is to provide essential information on the current status and future evolution of the habitat of two fish species in Nunavik and Nunavut that play a key role in the food security of northern communities: Arctic char (*Salvelinus alpinus*) and lake trout (*Salvelinus namaycush*). Arctic char are harvested year-round, while lake trout are mainly fished in winter (ice fishing). While lake trout spend their entire life cycle in lakes, the different morphs of Arctic char are found in lakes, rivers, and coastal environments, and can move from one habitat to another depending on their life stage. There is very little information on the availability and quality of the habitats of these two species, habitats that are likely to be altered by climate change. This project seeks to fill those gaps by combining field monitoring and modelling. The project will provide a better understanding of the changes in temperature and oxygen content of lakes and rivers in response to climate change (higher air temperatures, longer summer seasons, browning of waters), and qualify these habitats that play an important ecological role. The project will also contribute to the development of management tools for anadromous Arctic char. Through regular exchanges with local communities and government agencies, this project will provide tools to support fisheries management and food security.

2021-2022 project highlights

Over the past year, PhD student Kimia Motevalli collected high-frequency meteorological and hydrological data from oxygen, temperature, and light sensors for Lac Tantaré (47°N) and for a lake located near the Bylot Island camp (73°N).

Source/Isabelle Laurion

The pandemic restrictions prevented the collection of data from other lakes. PhD student Véronique Dubos conducted field work to set up three moorings to measure vertical temperature and oxygen profiles over a one-year period. One mooring was installed in Lake Tasirjuarusik in Kangirsuk. This lake is home to several fish species, including resident and anadromous Arctic chair, lake trout, and brook trout. The other two moorings were set up in Lake Tasikallak, north of Kangiqsualujjuaq. Guides who were on site and had the necessary instruments were able to record oxygen and temperature vertical profiles in Kangirsuk and in Aupaluk. Simon Joly-Naud, a master's student, conducted a preliminary sampling of water at the outlet of 15 major salmon rivers in Eastern Québec in the fall of 2021. He then characterized the dissolved organic matter (DOM) of the rivers in the lab, according to their optical properties. Using geographic information systems (GIS), he gathered quantitative information on the characteristics of the pools. Once the database was complete, spatial analyses were conducted to gain a better understanding of the processes governing the spatial distribution of DOM in Eastern Québec. Lastly, a four-level browning gradient was installed based on the results, in order to determine which river pools would be studied during the monitoring and sampling period in Summer 2022.

3

NUNATSIAVUT COASTAL INTERACTIONS PROJECT (NCIP): CLIMATE, ENVIRONMENT, AND LABRADOR INUIT SUBSISTENCE STRATEGIES

PROJECT STARTED IN JULY 2020

Lead investigator: James Woollett (ULaval)

Co-applicants: Najat Bhiry (ULaval), Anne de Vernal (UQAM), Philippe Gachon (UQAM), Audrey Limoges (UNB) and Reinhard Pienitz (ULaval)

Description

Global warming and associated changes in sea-ice conditions have a substantial impact on (sub)Arctic ecosystems and the services they support (e.g., land-fast sea ice platforms for hunting, fishing, travelling, and provisioning services). These changes have direct consequences for the subsistence economy and traditional cultural activities of coastal Inuit communities. The nature and magnitude of future changes will vary from one region to another, depending on specific environmental parameters, and will require new adaptive and management strategies. The NCIP project brings together a transdisciplinary group of researchers who collaborate closely with the community of Nain, in Nunatsiavut, to investigate the priority questions that the community would like to address in relation to their changing environment. This project seeks to assess the vulnerability and resilience of the coastal ecosystem in the Nain area in response to climate fluctuations over the last 12,000 years and, with this knowledge, to more accurately predict the impacts of contemporary climate changes in the near future. The project will produce data relevant for the evaluation of future climate trajectories and the potential impacts of climate change on Inuit food security, harvesting, and winter travel routes in the Nain region, which are key considerations for sustainable management of marine resources. It will also provide a unique local and integrated historical ecology framework for understanding past cultural transformations, movements, and subsistence practices of Inuit communities in the Nain region.

2021-2022 project highlights

Professor Audrey Limoges's team carried out a data collection project aboard the *R/V William Kennedy* research vessel in August and September 2021 that allowed them to sample ocean floor sediments and the water column at 35 different sites in the study zone. Preliminary analyses detailing the granulometry of the seabed, the benthic biota, and diatom microfossils and dinoflagellate cysts were completed in March 2022. Sediment core samples from the continental shelf off Nain Bay that had been previously collected and archived were analyzed in the same manner in Professor Anne de Vernal's lab at UQAM.

Another field project allowed the researchers to document archeological components, the level of erosion, and the organic preservation of the study sites. James Woollett's team collected samples of seal bones for isotopic analysis; seal teeth for thin-section histological preparation; and bone and charcoal samples for carbon-14 dating using Université Laval's archeological collections. Analyses were conducted on animal bone fragments collected at the Aulatisivik Sud 6 site.

Paleolimnological reconstruction of freshwater ecosystems was carried out in the study zone, based on analyses of the microfossil assemblies of diatoms and pollen in two lakes in the Nain region.

4

HOUSING AND ENERGY TRANSITION IN NUNAVIK: GAINING A BETTER UNDERSTANDING OF HUMAN, TECHNICAL, AND ENVIRONMENTAL ISSUES

PROJECT STARTED IN JULY 2020

Lead investigator: Louis Gosselin (ULaval)

Co-applicants: Geneviève Cloutier (ULaval), Myriam Blais (ULaval), André Potvin (ULaval), Geneviève Vachon (ULaval) and Mourad Ben Amor (UdeS)

Students involved: one master's student and one PhD student

Description

This project aims to advance the state of knowledge on high-efficiency and sustainable residential buildings in order to promote the energy transition in Nunavik by and for local communities. Since the energy supply is currently dependent on fossil fuels, this project focuses on the role of housing from a perspective of the energy transition. Ultimately, the project will provide data, tools, and guidelines for more energy-efficient design, operation, and life-cycle of housing in Nunavik.

2021-2022 project highlights

Many of the residential buildings in Nunavik are ventilated naturally, i.e., when the air needs refreshing, the residents have to open the windows, which obviously creates significant energy impacts. In the past year, the research team analyzed data relating to window use in 12 dwellings in Quaqtaq, to help explain the factors influencing their opening and to develop predictive models. The researchers also conducted life-cycle analyses of electricity and heating in Nunavik. In addition, the team began work to develop strategies to regionalize life-cycle analyses in Nunavik, both in terms of inventories and the impacts of the life cycle.

For more information: The challenge of carbon neutrality in Nunavik

Source/Gabrielle Fortin

5

UVILUQ: THE USE OF LIQUID BIOPSIES FOR MONITORING THE HEALTH OF COASTAL MARINE ECOSYSTEMS

PROJECT STARTED IN JULY 2020

Lead investigator: Yves St-Pierre (INRS)
Co-applicants: Philippe Archambault (ULaval) and Jacques Corbeil (ULaval)
Students involved: one master's student, one PhD student, and three post-doctoral fellows

Description

Because of their wide distribution and their ecological and nutritional importance, blue mussels are closely monitored by scientists and public health authorities. In Northern Canada, and particularly in Nunavik communities located on the eastern shore of Hudson Bay and the southern shores of Hudson Strait and Ungava Bay, the consumption of bivalves, such as the blue mussel and other seafood, represents an important part of the traditional Inuit diet. Unfortunately, the presence of many pathogens, often linked to anthropogenic activities in the area, is worsening the problem of food insecurity in these communities. In addition to providing information essential to the food security of northern communities, the analysis of the health of blue mussels is an important tool for monitoring the impact of human activities on coastal marine ecosystems.

In this project, we propose a new, blue mussel sampling and analysis platform based on the concept of liquid biopsy combined with multiomics approaches.

2021-2022 project highlights

Over the course of the past year, the team continued to develop its multiomics approaches in order to carry out blue mussel sampling at several sites. The multiomics approach included analysis of the metabolome, microbiome, and transcriptome. In Summer 2021, the team carried out mussel sampling in Nunavik (Rivière à la Baleine and George River). Although the sampling period was cut short due to a new wave of COVID-19, the team was still able to collect enough blue mussel liquid biopsy samples to study the microbiomes using hemolymphatic DNA, and to develop a ccfDNA analysis via the Nanopore platform, which is ideal for long, hemolymphatic DNA fragments.


Source/Julie Perreault

The researchers continued their work to develop a biocomputing pipeline to analyze viromes in mussels. Lastly, in Spring 2022, the research team planned its next sampling campaigns, which will take place in the summer of 2022 in several Nunavik communities. In short, in spite of the pandemic, this second year was a productive one, and has the researchers feeling optimistic about both the use of liquid biopsies as an important tool for monitoring the health of coastal marine ecosystems in Nunavik, as well as the development of simple methods to monitor for the presence of pathogens in mussel beds.

6

LINKING THE MARINE ENVIRONMENT AND THE NUTRITIONAL QUALITY OF SHELLFISH AND BELUGA NEAR QUAQTAQ

PROJECT STARTED IN NOVEMBER 2019

Lead investigators: Mélanie Lemire (ULaval) and Jean-Éric Tremblay (ULaval)

Co-applicants: Marc Amyot (UdeM), Philippe Archambault (ULaval), Pierre Ayotte (ULaval) and Nicolas Derome (ULaval)

Students involved: two master's students and one post-doctoral fellow

Description

Beluga and shellfish are an integral part of culture, diet, and food security in Quaqtaq. The migrating beluga harvested in Quaqtaq belong to two distinct populations in Hudson Bay, one from the west and the other from the east. A recent study in Nunavik showed that beluga maattaq, an Inuit delicacy made with beluga skin and fat, is exceptionally high in selenoneine, a potential antidote against mercury toxicity. This study seeks to provide new knowledge on how the mercury, selenoneine, and fatty acid in belugas vary with respect to their particular population, diet, age, and sex. Shellfish are also consumed frequently by the Inuit, and offer significant potential for food insecurity prevention strategies. Moreover, shellfish can serve as indicators of water quality and ocean health since they accumulate contaminants and nutrients when they filter water and algae or consume particles that have settled on the sediment. A longer-term benefit of the project is to provide the community of Quaqtaq with the means to monitor the condition of the ocean and the seafloor resources in order to continue to use them in a sustainable manner.

2021-2022 project highlights

Because of the pandemic and the challenges of travelling to the North, it was not possible to conduct sampling on the marine mammal population this year. However, the research team managed to achieve the project's objectives by carrying out numerous analyses on its existing samples. Again, the pandemic prevented the team from sampling the benthos in 2020, but they were able to acquire new samples in 2021.

Source/iStock

7

TECHNICAL-SOCIAL SOLUTIONS TO EXPAND THE USE OF RENEWABLE ENERGIES FROM WHAPMAGOOSTUI-KUUJJUARAPIK TO OTHER REGIONS OF NUNAVIK

PROJECT STARTED IN NOVEMBER 2019

Lead investigator: Jasmin Raymond (INRS)

Co-applicants: Louis Gosselin (ULaval), Christophe Krolik (ULaval) and Thierry Rodon (ULaval)

Students involved: one undergraduate, three master's students, one PhD student, and one post-doctoral fellow

Description

One of the growing challenges facing Canadians is the sustainable development of the North. While in the South, Canada is gradually shifting away from fossil fuels towards renewable energy, remote Indigenous communities rely on heat and electricity production that is fully dependent on diesel and highly subsidized. Given the extraordinary transformations northern regions are experiencing due to climate change, a number of clean technology initiatives have been rolled out, however their scope remains limited, notably because of temporal variations in sunshine and wind. In order to achieve mass deployment of these technologies, we need to address the issues of renewable heat supply and long-term energy storage in cold regions. This is the main objective of the research project, which relies on a multi-sectoral approach to tackle this issue, both technically and societally. The proposed research will help define and optimize energy management strategies adapted not only to the polar climate, but also to the northern socio-political context. The potential benefits of this project are considerable. With viable energy production and storage solutions, renewable energy technologies will finally be able to meet a broader range of needs and play their rightful role in the sustainable development of the North.

Source/ INRS

2021-2022 project highlights

The INRS team travelled to Nunavik in July 2021 to assess the availability of clean and renewable energy from the subsoil. Three master's students and a research professional carried out work to further scientific knowledge on the geothermal potential of two northern villages. In Whapmagoostui-Kuujjuarapik, they focused on underground thermal storage, first assessing the thermal properties of the soil using a heated cable to inject heat, then installing instruments to measure the energy demand of buildings at the Centre d'études nordiques scientific complex. A little further north, in Umiujaq, the various geological units in both the bedrock and unconsolidated deposits were sampled, with a view to analyzing their physical and thermal properties at the INRS laboratory. This was necessary in order to subsequently assess the soil's capacity to heat the buildings using a geothermal heat pump system.

8

MAPPING KUUJUAQ'S MARITIME VULNERABILITY: A PARTICIPATIVE APPROACH CO-CONSTRUCTED TOGETHER WITH LOCAL AND INDIGENOUS KNOWLEDGE

PROJECT STARTED IN NOVEMBER 2021

Lead investigator: David Didier (UQAR)

Co-Investigator: Justine Gagnon (ULaval)

Managing a maritime incident in Nunavik involves several sectors of activity and requires a good knowledge of the environment. To better respond to the risks associated with maritime incidents, a map of the maritime vulnerability of the Koksoak River estuary, more precisely in the territory of Kuujjuaq, will be made. First, the concept of coastal and maritime vulnerability will be defined and established using local and Indigenous knowledge through consultation and a participatory mapping exercise. Then, the coast of the Koksoak River estuary will be characterized and segmented using a morphological classification to assess its sensitivity to the potential impacts of a maritime incident. Lastly, the most sensitive and resilient elements will be identified and discussed with the various stakeholders. By understanding the vulnerability and its parameters, it is possible to act before a hazard occurs, to increase the resilience of certain elements. In addition, the development and sharing of a mapping tool helps increase preparedness for managing a maritime incident, while addressing the needs of the community of Kuujjuaq.

Source/Harry Bosum

INQ-FUNDED RESEARCH PROJECTS UNDERWAY

PROJECT 1 | Dynamics of the Innu ancestral territory (Nitassinan) through the morpho-sedimentary and socio-cultural study of Lake Manicouagan (reservoir)

1 Uapishka Station
2 Université Laval
3 Institut national de la recherche scientifique
4 Uapishka Station
5 Franquelin
6 Pessamit First Nation

PROJECT 2 | Impacts of climate change and browning on salmonid oxythermal habitat and greenhouse gas emissions in Arctic regions

1 Kangirsuk
2 Kangiqsualujjuaq
3 Institut national de la recherche scientifique
4 Institut national de la recherche scientifique
5 Université Laval
6 Makivik Corporation
7 Qikiqtani Inuit Association
8 Lac Tantaré
9 Bylot Island
10 Lac Tasirjuarusik
11 Aupaluk

PROJECT 3 | climate, environment, and Labrador Inuit subsistence strategies

1 Université Laval
2 Université Laval
3 Université du Québec à Montréal
4 University of New Brunswick
5 Geological Survey of Canada
6 Trent University
7 Nain

PROJECT 4 | Housing and energy transition in Nunavik: gaining a better understanding of human, technical, and environmental issues

1 Université Laval
2 Université Laval
3 Université de Sherbrooke – Campus principal
4 Société d'habitation du Québec
5 Transition énergétique Québec
6 Quaqtaq
7 George River
8 Rivière à la Baleine

PROJECT 5 | UVILUQ: The use of liquid biopsies for monitoring the health of coastal marine ecosystems

1 Institut national de la recherche scientifique
2 Université Laval
3 Québec Indigenous Science and Engineering Association
4 ArcticNet
5 Northern Institute for Research in Environment and Occupational Health and Safety
6 Parks Canada – Saguenay–St. Lawrence Management Unit
7 Port de Sept-Îles
8 CNRS – Unité Stress Environnementaux et BIOsurveillance des milieux aquatiques

PROJECT 6 | Linking the marine environment and the nutritional quality of shellfish and beluga near Quaqtaq

1 Université Laval
2 Université de Montréal
3 Quaqtaq
4 Nunavik Marine Region Wildlife Board

PROJECT 7 | Technical-social solutions to expand the use of renewable energy from Whapmagoostui-Kuujjuarapik to other regions of Nunavik

1 Institut national de la recherche scientifique
2 Université Laval
3 Cégep de Jonquière
4 Carboniq
5 Nergica
6 Englobe – Nunatech
7 Transition énergétique Québec
8 Complexe de recherche Whapmagoostui-Kuujjuarapik (CEN)
9 Gaspé
10 Umiujaq
11 Kuujjuaq

PROJECT 8 | Mapping of Kuujjuaq's maritime vulnerability: a participative approach co-constructed together with local and Indigenous knowledge

1 Rivière Koksoak
2 Université du Québec à Rimouski
3 Université Laval

LÉGENDE

Lieu d'attache du chercheur principal | Lieu d'attache des cochercheurs | Partenaire | Terrain de recherche

SUSTAINABLE DEVELOPMENT OF THE NORTH: IT'S IN INQ'S DNA

In the past year, Institut nordique du Québec and the Sustainable Development Committee carried out an initial round of analysis of INQ-funded projects, from the specific perspective of sustainable development. Five projects co-funded by INQ and Sentinel North under the Partnership Research Program for a Sustainable North were examined. The other projects will be evaluated in a subsequent round once they are further advanced.

BACKGROUND

In 2015, the member states of the United Nations adopted the 2030 Agenda for Sustainable Development. At the heart of the Agenda are 17 sustainable development goals (SDGs) and 169 targets that provide a framework for eradicating poverty, reducing inequalities, improving health and education, promoting economic growth, preserving biodiversity, and fighting climate change.

HOW CAN WE EVALUATE INQ'S PROJECTS ACCORDING TO THE UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOALS (SDGs)?

In analyzing the INQ-SN research projects, the INQ Sustainable Development Committee added two targets in order to address the aspirations of northern communities regarding the spinoffs from research on their communities and the recognition of traditional knowledge based on millennia of interaction with the land.

PROJECTS EVALUATED | 2021-2022

> *The impacts of climate change and browning on salmonid oxythermal habitat and greenhouse gas emissions in Arctic regions*
Lead investigator: Isabelle Laurion, INRS

> *Technical-social solutions to expand the use of renewable energy from Whapmagoostui-Kuujjuarapik to other regions of Nunavik*
Lead investigator: Jasmin Raymond, INRS

> *Housing and the energy transition in Nunavik: Gaining a better understanding of human, technical, and environmental issues*
Lead investigator: Louis Gosselin, ULaval

> *Dynamics of the Innu ancestral territory (Nitassinan) through the morpho-sedimentary and socio-cultural study of Lake Manicouagan Reservoir*
Lead investigator: Patrick Lajeunesse, ULaval

> *UVILUQ: The use of liquid biopsies for monitoring the health of coastal marine ecosystems*
Lead investigator: Yves St-Pierre, INRS

ADDITIONAL CRITERIA PROPOSED BY THE EVALUATION COMMITTEE

18. Training and Employment*

The project will help:

1. Boost the technical and professional skills of local populations affected by the project, notably through the hiring and training of staff;
2. Improve access to university and college education for local populations affected by the project;
3. Ensure that more people acquire the knowledge and skills required to promote sustainable development.

* These three SDGs were combined under Goal 18 for the purposes of analysis and presentation.

19. Sharing of Local Knowledge and Know-how*

The project will help:

1. Promote the use and fair and equitable sharing of local knowledge;
2. Ensure the fair and equitable sharing of knowledge created by the project among the local communities involved;
3. Improve access to science, technology, and innovation in Northern Québec;
4. Bolster the scientific and technological capacities of Indigenous and non-Indigenous communities in Northern Québec;
5. Strengthen partnerships aimed at mobilizing and sharing specialized knowledge and know-how;
6. Increase the amount of quality, up-to-date, and accurate data on Northern Québec.

* These six SDGs were combined under Goal 19 for the purposes of analysis and presentation.

AN ESPECIALLY REMARKABLE PROJECT

The project *The impacts of climate change and browning on salmonid oxythermal habitat and greenhouse gas emissions in Arctic regions* headed by researcher Isabelle Laurion obtained the top result of the group, meeting 70% of the sustainable development goals. The evaluation committee noted that Laurion's project contributes to both the ecological and human aspects of the sustainable development of northern communities.

This logo appears next to projects with a positive sustainable development aspect.

GENERAL COMMENTS

As for the other four research projects they evaluated, the committee members noted a number of positive aspects, specifically with respect to the sharing of local knowledge and know-how, a goal that is central to all the projects evaluated this year. The evaluation committee also emphasized the fact that each of the 19 goals (17 enshrined by the UN and two additional goals formulated by the committee) was represented in at least one of the five projects.

INQ INFRASTRUCTURE

INQ SCIENTIFIC COMPLEX

This pavilion, which will be located on the Université Laval campus, will act as a knowledge and research hub for northern development. The only one of its kind in Canada, the pavilion will promote northern innovation, interdisciplinarity, and teamwork. It will help consolidate the partnerships developed with northern communities, Indigenous nations in the North, the 16 member universities, the college network, as well as public and private-sector actors.

The multipurpose complex will be dedicated to supporting science and the sustainable development of the North:

> Logistical, material, and technical support for northern research on land and at sea;

> Analytical platforms and services;

> Versatile and modular labs;

> An incubator for technological and social innovation;

> A multidisciplinary and intersectoral training environment (students and workers);

> An educational showcase on the changing North;

> A space for gathering and exchange for the scientific community, First Peoples, partners, and the general public.

UAPISHKA STATION

Uapishka Station is an ecotourism joint venture between the Pessamit Innu Council and the Manicouagan-Uapishka World Biosphere Reserve. A remarkable example of co-management, the Station boasts exceptional natural surroundings while offering logistical support for scientific activities and the transmission of Indigenous culture, as well as accommodations, food services, and outdoor activities.

Over the past year, Uapishka Station set up a meteorological station at the summit of Monts Groulx. The Station managers also acquired an emergency shelter that it erected on the shore of Lac de la Plénitude, in order to enhance the safety of scientists working in the area, which is known for its rapidly changing weather conditions and harsh environment.

UMIUJAQ RESEARCH STATION

Acquired by Centre d'études nordiques (CEN) in 2010, the Umiujaq Research Station in Nunavik is ideally located for the study of climate dynamics, permafrost, and subarctic ecosystems. Widely used by scientists from Canada and abroad, the current station will be sold and a new station will be built (on a different site) to meet the growing demand of research teams looking to stay there to conduct their research. CEN plans to build a carbon-neutral, smart building better suited to the needs of Arctic research and participatory science. The new station will also include space for training and community use. In the winter of 2022, the CEN team secured an additional $379,000 in funding from the Northern REACHE Program (CIRNAC) to acquire and integrate alternative energy systems. The project is on schedule, and construction is slated to begin in Summer 2023, with the station up and running in 2024.

Source/RMBMU – Marianne Valcourt

STRATEGIC OUTREACH AND POSITIONING

September 21 to 23, 2021 | INQ partners with 2021 National Building Reconciliation Forum

Since 2015, Canadian universities, supported by Universities Canada, have organized an annual forum bringing together leaders from universities, colleges, and Indigenous communities to create meaningful and lasting institutional change in the higher education sector to advance reconciliation. INQ was actively involved in organizing the forum, which was held at Université Laval in 2021. More details available on page 12 of this report.

October 14 to 17, 2021 | INQ at 2021 Arctic Circle Assembly

An INQ delegation took part in the 2021 edition of this international gathering on the Arctic held every year in Reykjavík, Iceland. INQ hosted two sessions:

> *Quebec's Arctic geopolitics*

> Winners of *My Northern Project / Mon projet nordique competition:* Quebec and Nordic countries (PhD students) – INQ presented this session in cooperation with its partner, University of the Arctic (UArctic).

October 22, 2022 | Follow-up meeting to implement the Secretariat of the Arctic Council's Sustainable Development Working Group (SDWG)

Meeting to take stock of progress on the new, permanent secretariat of the Arctic Council's Sustainable Development Working Group at Université Laval

Attendees

> Heidi Kutz, Senior Arctic Official and Director General: Arctic, Eurasian, and European Affairs, Global Affairs Canada

> Jutta Wark, Director, Global Affairs Canada

> Julie Plourde, Senior Policy Officer – Arctic and Polar Policies for Global Affairs Canada

> Sarah Cox, Director, Circumpolar Affairs and Delegation Leader at Crown-Indigenous Relations and representative for Canada on the Arctic Council's SDWG

> Jean-Éric Tremblay, INQ Scientific Director

> Brigitte Bigué, INQ Executive Director

> Gérard Duhaime, Professor, Department of Sociology, Université Laval

> Robert Sauvé, Strategic Advisor for the North and the Arctic, Université Laval

October 26, 2021 | INQ takes part in the plenary session of the Arctic Council's Sustainable Development Working Group

At the meeting, INQ scientific director Jean-Éric Tremblay presented Université Laval's ecosystem of northern research. The meeting was attended by 133 people.

October 28, 2021 | INQ presents its plan to implement the Secretariat of the Arctic Council's Sustainable Development Working Group.

INQ executive director Brigitte Bigué presented the implementation plan to the executive committee of the Arctic Council. The meeting was attended by 34 people from seven Arctic states: Canada, Denmark, Finland, Iceland, Norway, Russia, and the United States, as well as a number of Indigenous organizations.

November 22, 2021 | Implementing Self-Government in the Nordic Countries, Greenland, and Northern Canada

The INQ Research Chair on Northern Sustainable Development, in partnership with CIÉRA and INQ held a round table where four specialists analyzed the different forms of territorial and non-territorial self-government arrangements developing in the Arctic.

Specialists:

> Jo Saglie (Institute for Social Research, Oslo) – *The Nordic Sámi parliaments: cases of non-territorial autonomy*

> Uffe Jakobsen and Henrik Larsen (University of Copenhagen) – *Greenland as a future sovereign state?*

> Maria Ackrén (University of Greenland) – *Greenland's Involvement in International Relations*

> Thierry Rodon (Université Laval) – *Inuit Governance in the Canadian Arctic*

February 8, 2022 | Second meeting with the Arctic Council Executive Committee regarding the future Secretariat of the Arctic Council's Sustainable Development Working Group

The persons in charge of implementing the new secretariat met with the Arctic Council Executive Committee for the second time, to present the latest developments.

March 22 to 24, 2022 | INQ partners with Expo-Sciences Autochtone (Québec Indigenous Science Fair)

The INQ team contributed to the success of the event. The theme of the 2022 edition was *Science in Action with Indigenous Peoples*. Some thirty teams made up of Indigenous students attended the event, which was held online due to the pandemic.

INQ GOVERNANCE

Executive Committee

Eugénie Brouillet
Chair of the Executive Committee,
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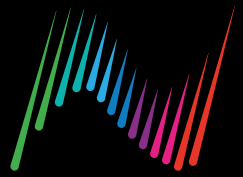

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