

**NSERC - UQAT
Industrial Chair on
northern biodiversity in
a mining context**

APRIL 27 & 28 2022

A photograph of a forest with a cleared area in the foreground. The foreground shows dark, rich soil with small green plants and ferns growing. The background is a dense forest of tall, thin evergreen trees under a bright sky.

**PARTICIPANT'S
WORKBOOK**

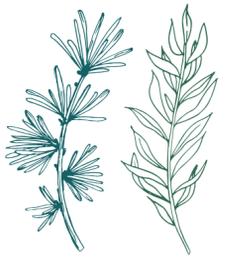
Mission of the BMC Chair

The mission of the Chair is to generate and disseminate knowledge on northern biodiversity in order to develop strategies to reduce the ecological footprint of a mine throughout its life cycle, in a context of multiple disturbances, including climate change, and with a view to including both scientific and traditional knowledge.

The objectives

- Reduce the ecological footprint of mines on biodiversity during their entire life cycle
- Avoid risk to biodiversity by developing tools for ecological planning
- Reduce cumulative impacts on ecosystem services provided by biodiversity





Présenter

Title

OBJECTIF 1

8h30	30 min.		Accueil et arrivée des participants
9h	15 min.	Nicole Fenton	Mot de bienvenue - Portrait de la Chaire et retour sur l'année 2021
9h15	30 min.	Xiangbo Yin	Déterminer l'empreinte des mines à l'aide de la végétation et de la phyllosphère
9h45	5 min.		Période de questions
9h50	20 min.	Mélanie Jean	Empreinte spatiale des polluants particulaires autour des mines actives et restaurées - croissance et bioaccumulation des bryophytes
10h10	5 min.		Période de questions
10h15	30 min.		Pause
10h45	20 min.	Christine Martineau	Empreinte spatiale des mines sur les propriétés physico-chimiques et biologiques des sols, des sédiments et de l'eau
11h05	5 min.		Période de questions
11h10	10 min.	Kadiatou Soumah	Impacts des mines sur la biodiversité: "modélisation des stratégies visant à réduire l'empreinte des mines sur le paysage environnant"
11h20	5 min.		Période de questions
11h25	20 min.	Présentatrices invitées Eleanor Berryman & Amy Cleaver Ressources naturelles Canada	Casa Berardi and Joutel dust monitoring program
11h45	5 min.		Période de questions

Midi

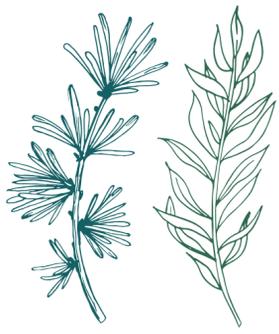
Dîner

OBJECTIFS 1 & 3

13h15	20 min.	Présentateur invité - Frédéric Poisson - MELCC	La Chaire BCM et la DCE vers un horizon de projets !
13h35	10 min.		Période de questions
13h45	20 min.	Nils Ambec	Importance régionale des parcs à résidus miniers pour la biodiversité des plantes
14h05	5 min.		Période de questions
14h10	20 min.	Maxime Thomas	Diminuer les impacts cumulatifs sur les services écosystémiques fournis par la Biodiversité
14h30	5 min.		Période de questions
14h35	30 min.		Pause
15h05	20 min.	Carlos Cerrejón Lozano	Évaluer la diversité alpha et bêta d'espèces discrètes à l'aide de données satellitaires à différentes résolutions spatiales
15h25	5 min.		Période de questions
15h30	20 min.	Présentatrice invitée Laura Hjartarson (U. Laval)	Biological soil crusts at abandoned borrow pits, as a proxy for mine sites
15h50	5 min.		Période de questions
15h50			Fin de la première journée de conférences



Schedule April 28th 2022

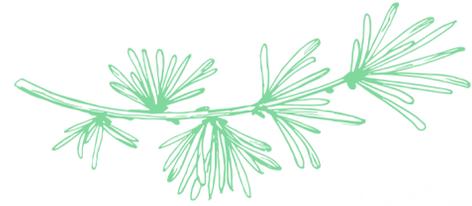
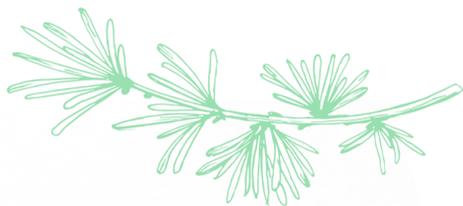


OBJECTIF 2

Présenter

Title

9h	20 min.	Marc-Frédéric Indorf	Projet de recherche sur la végétation des tourbières jamésiennes
9h20	10 min.		Période de questions
9h30	20 min.	Présentatrice invitée Nicole Balliston	Hydrophysiological and geochemical changes in disturbed sub-arctic patterned peatlands induced by mine dewatering
9h50	10 min.		
10h00	20 min.	Mariano Feldman	Bird assemblages and habitat characteristics in northern landscapes
10h20	5 min.		Période de questions
10h25	30 min.	Éliane Grant	Utilisation et importance des milieux humides par les autochtones et évaluation du stress chez l'original à proximité d'exploitations minières en Eeyou Istchee
10h55	5 min.		Période de questions
11h00	30 min.		Pause
11h30	20 min.	Camilo Gomez	Double regard sur les tourbières du Québec nordique : Indice écologique multidimensionnel pour les tourbières
11h50	5 min.		Période de questions
11h55	20 min.	Julia Morarin	Atlas de biodiversité : Écosystèmes des tourbières
12h15	5 min.		Période de questions
12h20			Fin des conférences
13h00			Rencontre du comité d'orientation



*About the
presenters*



Xiangbo Yin



Name : Xiangbo Yin

Nationality : chinese

Education :

- Doctoral student at the Forest Research Institute of UQAT;
- M.Sc. in Botany (Bryology); East China Normal University;
- B.Sc. in Agriculture from the Faculty of Science and Engineering, China Agricultural University.

Research interests :

- Taxonomy and ecology of bryophytes;
- Microbial ecology;
- Horticultural culture.

Passions :

- Travel;
- Photography;
- Traditional Chinese painting.

Abstract of Xiangbo's presentation

Off-site effects of mines on understory communities were quantified using understory plants and moss phyllosphere microbiomes around six mine sites. We found that off-site effects of mines affected understory and phyllosphere diversity. Negative effects on understory diversity were greater near operating mine sites than at non-operating sites. Deciduous and mixed forest understory plant species were more affected than coniferous forest species. Ecosystem types did not affect off-site effects on phyllosphere diversity. The strongest effects were generally observed within 200 meters of the mines. Given the predicted changes in boreal forest ecosystems with the encroachment of deciduous species on coniferous forests and the increased sensitivity of mixed and deciduous forests, the area affected by off-site effects of mines may increase in the future. We suggest that off-site effects be included in ecological assessments.

Dr Mélanie Jean



Name : Mélanie Jean

Nationality : canadian

Education :

- Post-doc, 2018-2020, Université du Québec en Abitibi-Témiscamigue;
- Post-doc, 2017-2018, Northern Arizona University;
- PhD, 2017, University of Saskatchewan;
- MSc, 2012, Université Laval;
- BSc, 2009, Université de Montréal.

Research interests :

- Plant ecology;
- Bryophytes;
- Plant-soil interactions;
- boreal forest;
- Nitrogen fixation;
- Community dynamics;
- Functional traits.

Guest speaker

Indirect impacts of mines are still poorly understood, particularly in the boreal forest, and may vary with the life cycle of the mine and the surrounding ecosystem. We aim to determine the spatial footprint of mines by 1) assessing baseline metal concentrations, 2) assessing how mine life cycle and ecosystem type influence the spatial extent of pollution, 3) measuring impacts on moss growth, and 4) comparing concentrations measured in different moss species. We sampled around six mines at different stages, along 100 m transects perpendicular to the perimeter of each mine and in control plots in 2018-2020. Concentrations of 25 elements were (or will be) measured on 307 samples of the moss *Pleurozium schreberi*, 34 *Callicladium haldanianum*, and 28 sphagnum mosses. Annual growth was measured on *P. schreberi*. Our preliminary results indicate that higher metal concentrations than controls were found up to about 200 m from the edge around an active mine and concentrations are lower around the Joutel mine (closed since 1998) than LaRonde (active), but trends vary spatially. Our results will contribute to reducing the environmental impacts of mining activities in the boreal forest.

Christine
Martineau



Name : Christine Martineau

Nationality : canadienne

Christine Martineau is a research scientist specializing in microbiology/microbial ecology at Laurentian Forestry Centre since 2018. She has extensive experience in molecular biology and environmental genomics. Over the years, she has studied microbial communities in various types of environments such as Arctic soils, plant rhizosphere, agricultural soils or mine tailings.

Abstract of Christine's presentation

Mines are associated with very local and visible disturbances at the point of implantation and with less visible disturbances beyond the point of implantation. The objective of this study, conducted in collaboration with the NSERC-UQAT Industrial Chair on Biodiversity in a Mining Context and the Canadian Forest Service, is to evaluate the impact of mines on the physico-chemical and biological properties of soils, sediments and water beyond the point of implementation. After working mainly in 2019 and 2020 on soil properties, the year 2021 was mainly devoted to finalizing sampling and laboratory analysis protocols for water and sediments, selection of stream and river sampling sites, and water and sediment sampling in the vicinity of 4 mine sites (Casa Berardi, Joutel, LaRonde, Akasaba). Two of the sites (Casa Berardi and Joutel) were sampled in June and September in order to assess the temporal variability of the different parameters measured in water and sediments. In this presentation, a summary of the results obtained to date for soils and an overview of the progress of the work for water and sediments will be presented.

Kadiatou Soumah



Name : Kadiatou Soumah

Nationality : guinéenne

Education :

- Master's student in Mineral Engineering, research profile (UQAT);
- Graduate in Environmental Sciences from CERE (Centre d'Étude et de Recherche en Environnement) of the University of Conakry;
- License 3 in Biology (ecology option) of the University of Conakry.

Abstract of Kadiatou's presentation

This study project is a master's degree to be carried out over a two-year period. It will consist in proposing georeferenced mine models with low damage on plant biodiversity. Thanks to ArcGIS software, scenarios will be made and the interactions between the different components of the model will be evaluated if necessary.

Since 2018, several research projects have been working on the off-site impacts of mining operations on ecosystems in six mines in Abitibi and in the northern region of Quebec in Canada, namely: the Akasaba mine (future mine to be established), the Casa Berardi mine (in operation since 1935), the Canadian Malartic mine (in operation since 1934), the Laronde mine (in operation since 1988), the Lapa mine (in the reclamation phase), and the Joutel mine (shut down since 1998) . The data obtained during this study was synthesized and grouped according to several criteria (abundance of selected plant species, distance of distribution of plant species around the mine sites...)

In this master project, we will use these different data to make multiple scenarios georeferenced in Arc GIS, we will choose different types of ecosystems representative of the region of Northern Quebec and Abitibi and we will integrate different factors of the mining sites to then evaluate the interactions in order to propose a model of mine with little damage on the plant biodiversity



Natural Resources
Canada

Ressources naturelles
Canada

Canada

Guest speakers

Abstract of Eleanor et d'Amy's presentation

Climate change increases the potential for dust mobilization. In response, there is a need to improve: 1) the monitoring of dust deposition and transport; and 2) our understanding of mine-dust impacts on the environment. The two mine sites being studied are Casa Berardi, an active underground/open pit gold mine, and Joutel, a historic gold mine, both situated in ombrotrophic environments sensitive to dust inputs. Passive dry deposition collectors (Pas-DDs) and dust canisters have been installed in transects around the sites. As the Pas-DDs are a newer technique, analysis will involve determining suitable gravimetric and mineralogical methods. This research program will pinpoint dust sources within the mine sites and identify the historic record of dust deposition. This will be achieved by leveraging the geochemical, isotopic, and mineralogical analysis of dust sources to identify source signatures in captured dusts and in dust archives recorded in peat cores. The environmental impact will be quantified through the evaluation of mineralogical controls on dust leaching in surface waters, their impact on the carbon storage capacity of peat, as well as geochemical and dispersion modelling. Taken together, this research will improve our understanding of mine dusts and their impact on their host ecosystems.

Nils Ambec



Name : Nils Ambec

Nationality : french

My name is Nils Ambec and I am a PhD student at UQAT since fall 2019. I am working on the diversity of vascular plants and bryophytes in the few contrasting habitats across the dominant forest of Abitibi. This presentation will focus specifically on abandoned mine sites and the extremely stressful soil they leave for plants. As open environments, I also compare them to other naturally open environments with naturally stressful soil for plants such as limestone and ultramafic outcrops.

Abstract of Nils's presentation

Since the beginning of industrialisation, seventy-five percent of the earth's ecosystems have been altered because of anthropic activities. However, through the creation of open habitats, these activities can also promote the establishment of certain specialised taxonomic groups. A common example is pastures for orchids and raptors. Mine sites may have an ambivalent effect. With polluted soils, they create stressful conditions for organisms and promote a small number of specialist species. With a world class gold deposit, the Abitibi region concentrates a cluster of mines both in operation and closed. The region is dominated by managed forests on the vast Abitibi greenstone belt, overlain with glaciolacustrine clay. Therefore, mine tailings create a rare habitat at the regional scale. In this project, we compared mine tailings' plant communities with other natural open habitats with stressful soils such as ultramafic rocks and limestone outcrops, with abandoned beaver ponds as control as they are natural open habitats. We hypothesize that (1) species communities on mine tailing sites are not homogeneous and (2) are different from other stressful habitats, mostly because (3) of the geochemistry driving plant species assemblages. Our results validate hypotheses (1) and (3) since mine tailing communities are not always similar, mostly because of the geochemistry. Since mine tailings vary, some of their communities resemble natural sites, mostly limestone outcrops, meaning that we rejected hypothesis (2). These results help to better discriminate mine tailings and, maybe, lead to a better approach when it comes to restoring them.

Frédéric Poisson



**Environnement
et Lutte contre
les changements
climatiques**

Québec 

Guest speaker

About Frédéric

French by birth, not quite a Quebecer yet.

Ecologist at the Ministry of the Environment and the Fight against Climate Change.

I work mainly on the analysis of the spatial organization of terrestrial ecosystems for their conservation and sustainable development.

Abstract of Frédéric's presentation

The presentation covers the Chair's projects that we fund and our projects that are directly related to the Chair's research

Maxime Thomas



Name : Maxime Thomas

Nationality : french

Education :

- Doctoral student at the Forest Research Institute of UQAT;
- Master in Plant Biology (Plants and Society) - Tours (France);
- Bachelor in Biology and Biochemistry - Tours and Saint-Etienne (France).

Abstract of Maxime's presentation

Canada's boreal forest is subject to many human and natural disturbances. These disturbances can affect not only the ecosystem but also Aboriginal communities. Aboriginal communities share a strong connection to their territory and depend on different species, called key cultural species, for their traditional activities. Labrador tea and blueberries are two of the species studied in this project. This project takes place in western Quebec, in the traditional territories of the communities of Pikogan, Nemaska and Mistissini. In these territories, the effect of mines and hydroelectric lines is of concern to the communities, and is therefore assessed on Labrador tea and blueberry. The effect of disturbance on these species is studied at the level of: i) their range, ii) their gene expression, to assess their internal response to disturbance, and iii) their concentration of compounds of medicinal/nutritional interest. Results are available for medicinal compounds in Labrador tea, indicating that these are favored by canopy disturbances. This project will provide a better understanding of the effect of disturbances on indigenous lifestyles through the lens of key cultural species.

Carlos Cerrejón
Lozano



Name : Carlos Cerrejón Lozano

Nationality : spanish

Education :

- Doctoral student at the Institute of Forest Research of UQAT;
- MSc degree in Biodiversity and Biology of Conservation - Sevilla;
- BSc degree in Environmental Sciences.

Abstract of Carlos's presentation

Lichens are ecologically important but sensitive species that are often overlooked in conservation planning. Remote sensing can help planners better understand their biodiversity patterns. This study aims to describe and model the alpha and beta diversity of lichens using remote sensing variables in a subarctic region of northern Quebec. Lichens were sampled in all habitat types present in the region. While high lichen richness was generally found, those plots richer in microhabitats often supported more species. Differences in species composition were identified, supported by differences in microhabitat composition. Poisson models explained a significant fraction of the variation in lichen richness (up to 32%). Mantel tests provided precise estimates of the relationship between beta diversity and spectral distance, confirming that areas that are more spectrally and thus environmentally different tend to harbor different lichen communities. This study contributes to our knowledge of lichen biodiversity in subarctic regions and informs the use of remote sensing to understand their biodiversity patterns.

Laura Hjartarson



UNIVERSITÉ
LAVAL

Abstract of Laura's presentation

In the search to find a holistic and cost-effective method of revegetation of northern extraction sites, the use of biological soil crusts (BSC) to accelerate primary succession is promising. BSC are communities that include lichen, bryophytes, and bacteria, that bind together with soil particles to form a surface crust. Their relevant ecological functions coupled with their ability to thrive in harsh environments make BSC well positioned to facilitate the functional recovery of degraded ecosystems. However, very little is known about BSC in Québec's boreal forest. Vegetation surveys of BSC establishing on abandoned borrow pits, formerly used for road construction, were conducted to characterize the lichen and bryophyte species of BSC spontaneously establishing and to identify the environmental factors governing the distribution of these communities. 16S rDNA and nifH gene sequencing was completed to characterize bacterial diversity under bare soil and three types of BSC located on abandoned mine tailings. The results highlight the diversity of lichen and bryophyte species present as part of the BSC, how these species form distinct communities shaped by abiotic variables and physicochemical soil properties.

Marc-Frédéric
Indorf



Name : Marc-Frédéric Indorf

Nationalité : french

Éducation :

Post-doctoral student at the Institut de recherche sur les forêts de l'UQAT

With interests in northern regions and sphagnum mosses, Marc-Frédéric

Indorf naturally found a point of

convergence in his doctoral project on the plant communities of peat bogs in the territory of Eeyou Istchee Baie-James. But before his arrival in Abitibi, he first spent his childhood on the family dairy farm in the USA, then made a career as a musician in France.

Abstract of Marc-Frédéric's presentation

In the remote area of Eeyou Istchee James-Bay in north-western Québec, Canada, there is an important need to better understand vegetation communities and how they may interact with climate change and increasing human activities (mainly mining and hydroelectricity production). Since peatlands occupy 14-50% of the territory, we chose undisturbed peatlands to study vegetation community assembly patterns across a 1000km gradient. For this, we developed an innovative spatial-hierarchical approach combining classical ordination methods, indicator species analysis, and randomisation techniques to test assembly hypotheses at various spatial scales and across different taxonomical groups. Surprisingly, environmental factors did not prove to be important for assembling communities at the regional scale. Results suggested instead either stochastic processes or an interaction between opposing factors (competition and environmental filtering on one side and facilitation and dispersal on the other). Coarser grain factors (e.g., climate and physiography) at the territorial scale did prove important for distinguishing regional species pools of tracheophytes, sphagna, and lichens, but not bryophytes and liverworts. At the finest scale, converging factors (e.g., facilitation) also proved significant. While contributing to baseline knowledge of peatland communities in the territory, our results show that different taxonomical groups respond differently to scale and that environmental factors have little effect or their effects may be integrated with other scales and factors. This understanding of how different communities and taxonomical groups respond to various assembly factors is necessary for better understanding resistance-resilience capacities of these communities over the near future.

Nicole Balliston



University of
Waterloo



Guest speaker

Abstract of Nicole's presentation

Patterned bog and fen peatlands of the Hudson Bay Lowlands (HBL), principally traditional lands of the Ojibwa, are globally significant stores of carbon, important water storage and regulating features, and are of traditional and ecological importance. At present, the HBL region faces the dual threats of resource extraction operations and increasing temperatures due to climate change, both of which may reduce water availability. Despite this, studies attempting to characterize the effects of reduced water availability on hydrological structure and function in HBL peatland complexes are extremely limited. Such information is required to better understand the trajectory of these systems under future disturbance scenarios. To this end, hydrological (i.e., streamflow and groundwater levels), meteorological (i.e., precipitation, snow depth, evapotranspiration, and temperature) and hydrogeological/geochemical (i.e., porewater samples, peat depth, and surface elevation) data were collected from a 1.5 km transect within the de-watering radius of the De Beers Victor Diamond Mine, over the 12 year mine lifespan. Over the study period, dewatering caused large downward water losses which lowered water tables beyond the range of natural variability, depleting water storage. Notable effects included reduced hydrological connectivity (50% less frequent on average), reduction of streamflow in impacted tributaries, landscape scale subsidence (average 14 cm), and a disruption of subsurface flowpaths which limited the delivery of ecologically important solutes to the surface of the downgradient fens. Altered conditions have the potential to permanently reduce peatland connectivity and shift solute-depleted fens towards nutrient poor bogs, however, the equilibrium state of these peatlands is currently unknown. Future research should focus on applying the responses to disturbance here to different locations and scales of peatland complex to better understand the cumulative effects of these anthropogenic disturbances on the trajectory of these systems.

Mariano Feldman



Name : Mariano Feldman

Nationality : argentinian

Education :

Doctoral candidate in environmental sciences at the Institut de recherche sur les forêts de l'UQAT

Passions: Soccer, playing guitar, nature hikes, observation, wildlife observation

Abstract of Mariano's presentation

Wetlands in boreal ecosystems play a critical role throughout the breeding season for bird communities. However, wetlands suffer from global impacts due to human land conversions and climate change pressures. We investigated whether bird species occupancy and attributes within the community differed between beaver and peatland ponds in James Bay Eeyou Istchee in 2018 and 2019. We assessed effects on bird occupancy as a function of red squirrel presence (an indicator of nest predation), forest cover surrounding the ponds, and latitudinal gradient. We detected 96 species that were grouped according to forest successional status: early successional species, late successional species, generalists, and wetland species. Beaver ponds were richer than bog ponds, which was primarily due to early successional species. The red squirrel had a negative influence on community richness. Late successional species responded positively to the forest cover surrounding the ponds. Our results highlight the benefits of habitat modification by beavers on bird communities as well as the negative effects of red squirrel presence. This information provides a better understanding of bird communities to help set priorities for regional wetland conservation.

Éliane Grant



Name : Éliane Grant

Eliane Grant lives in Eeyou Istchee and is a member of the Waswanipi community. She is first a mother, then a master's student in ecology at UQAT, a wildlife biologist in the natural resources department of the Cree First Nation of Waswanipi and a lecturer at the School of Native Studies.

Abstract of Éliane's presentation

The territory has been used for generations by Aboriginal people as a place to transmit knowledge, practice subsistence activities and gather. In addition to interviews to document the importance of wetlands to the practice of traditional activities for First Nations people in Eeyou Istchee, a second biological component will assess stress in moose (*Alces americanus*) as chronic stress can impact their overall health. Wetlands are not only central to the practice of traditional activities for aboriginal people, but are also essential for the survival of moose. This project is an opportunity to promote exchanges between the Eeyou communities of Nemaska, Mistissini and the Anicinape community of Pikogan as well as natural resource companies in the region, while hoping to provide answers to questions raised by First Nations members.

Camilo Gomez



Name : Camilo Gomez

Camilo Gomez was born in the Andean mountains of South America, where he studied Anthropology at Universidad de Los Andes in Bogota, Colombia. He also has a Ph.D. in anthropology with an emphasis on biodiversity, ecosystem services and sustainability from McGill University. With over ten years of experience, Camilo's work has combined Indigenous and scientific knowledge to foster collaborative work between Indigenous grassroots organizations, government agencies, and the academy. Today, he is a postdoctoral fellow at the Institute for Forest Research (IFR) at UQAT Université du Québec en Abitibi-Témiscamingue.

Abstract of Camilo's presentation

The tremendous value in terms of climate stability, biodiversity, water filtration, and erosion control of the approximately 11.6 million hectares of peatlands in Quebec can be calculated through the work of different authors. However, even though most of these vital peatland ecosystems are in the First Nation territories of the James Bay region, few authors have explored the socio-cultural values and environmental management that these communities have placed for generations on these lands. This lack of information is a problem because this area faces rapid changes due to anthropogenic factors like industrial development projects that can impact the fragile socio-ecological balance of peatlands: the environmental stability and the well-being of the different wildlife communities that inhabit these territories. We argue that negative impacts could be avoided, mitigated, and adequately compensated if development plans consider the socio-ecological relationship in peatlands by combining scientific data with Indigenous knowledge. After four years of cooperative work with the communities of Mistissini, Nemaska and Pikogan, we are building a tool to classify peatlands based on the value of biodiversity conservation and First Nations' priorities. This tool, called Multidimensional Ecological Richness Index for Peatlands, MERIP, combines methodologies used in both social and natural sciences to transmit information that can be easily used for adequate planning, monitoring, decision-making, and environmental rehabilitation.

Julia Morarin



Name : Julia Morarin

Nationality : french

Julia Morarin holds a master's degree in archaeobiology and paleoenvironment (University of Montpellier, France), as well as a master's degree in Native Studies (UQAT). Fueled by a never-ending curiosity and passionate about the arts and sciences, Julia now combines these worlds through the spectrum of scientific popularization.

The objective of the Atlas of Biodiversity: Wetlands project is to make the data collected by UQAT students on the territory accessible to members of the participating communities (Pikogan, Nemaska and Mistissini) and to the general public.

Abstract of Julia's presentation

Due to their ecological richness, peatlands are among the most important ecosystems in northern Quebec. Despite their importance in terms of ecological dynamics and biodiversity, peatlands are still poorly understood. This is why, for the past four years, UQAT students have been conducting research projects on the territory in collaboration with the Aboriginal communities of Pikogan (Abitibi-Témiscamingue), Nemaska and Mistissini (Eeyou Istchee).

The objective of these studies is to characterize and classify the environments according to the different types of organisms from the animal and plant kingdoms. Today, the results of these studies are available in the form of data tables.

One of the foundations of research with, by and for Aboriginal people is the return of data to communities. And while the return of digitized data is important to communities, it is not a usable format for all community members who are interested in and/or want to know about and access the results of this research. To overcome this lack, we propose to develop Biodiversity Atlases for the three communities mentioned above. Finally, taking into account that the overall objective of the project includes many ways of seeing and understanding biodiversity, we would like to emphasize the exchange and integration of knowledge with the people and organizations of the communities that wish to participate.

MERCI À TOUS LES PARTENAIRES DE LA CHAIRE INDUSTRIELLE CRSNG – UQAT SUR LA BIODIVERSITÉ EN CONTEXTE MINIER



**NSERC
CRSNG**



CANADIAN
MALARTIC
MINE



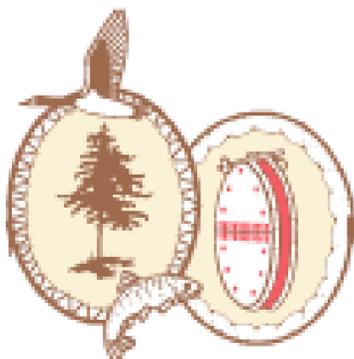
NEMASKA
LITHIUM



AGNICO EAGLE

Québec 

UQAT
LA FONDATION



·ÀσVdΔρέε Δ"ΓΓΔΔρέε ∇ ΔCLD·C° (Δρέε Δ"ΓΓ)
Grand Council of the Crees (Eeyou Istchee)
Grand Conseil des Cris (Eeyou Istchee)