

A Half Century of Research at the Centre d'études nordiques (CEN: Centre for Northern Studies): Rising to the Challenges

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Abstract: To mark the 50th anniversary of the Centre d'études nordiques (CEN: Centre for Northern Studies), this commentary presents a history of CEN over the last five decades. We first address the socio-political context at the time that CEN was founded, and the development of the centre over the first two decades of its existence, which was a period of emerging national and international interest in northern research. The subsequent evolution of CEN in terms of its research orientation is then described, and shows the relationship between research priorities in Canada and Québec over this period. The history of CEN underscores the ongoing importance of maintaining and developing field and laboratory infrastructure over the long term in support of research and training. This commentary also includes personal reflections based on the experience of the first author, who is a long-time member and former Director of CEN.

This is a full English language translation of the article

Résumé : Au moment où l'on célèbre les 50 ans d'existence du Centre d'études nordiques (CEN), le temps est mûr pour effectuer une synthèse des étapes majeures qu'a traversées le centre au cours de cette période. Dans ce compte rendu, nous abordons la question du contexte sociopolitique à l'origine de la création du CEN, puis du développement du centre au cours des deux premières décennies de son existence en insistant sur l'émergence, à cette époque, de la recherche nordique internationale et nationale. L'évolution des orientations et des programmes de recherche du CEN au cours des 50 dernières années est décrite en détail et mise en parallèle avec l'évolution des priorités de recherche du Canada et du Québec. Enfin, l'importance de maintenir et de développer des infrastructures de recherche sur le terrain et en laboratoire, afin d'assurer un encadrement et un développement de la recherche en sciences naturelles privilégiée par le CEN au cours de ces nombreuses années, est soulignée. Le lecteur trouvera tout au long de ce texte des éléments de réflexion personnelle venant de l'expérience vécue au CEN par le premier auteur, qui en est membre depuis la première décennie et qui a complété deux mandats en tant que directeur.

Introduction

The history of the Centre for Northern Studies (CEN) at Université Laval spans 50 years of research that are the focus of this special issue. Since its founding in 1961, CEN has gone through several distinct geopolitical and historical periods, and, as a research group, has witnessed the evolution of Canada and Québec's research structures while making significant contributions to our knowledge of northern regions. CEN resulted from a decision made by Université Laval after a long process initiated by its founder, Louis-Edmond Hamelin, who was at that time a professor of geography (Hamelin, 1960; Grenier, 1961). Such procedures being handled differently in those times, once Université Laval had formed CEN it was able to obtain by order of the Executive Chamber Council a grant for research in northern Québec from the Government of Québec on August 2, 1961. This became statutory funding over the course of the 1960s. The founder's initiative was opportune, as it fell in line with a widespread trend that saw executive counsels throughout North America moving to catalogue and exploit the vast northern territories in Canada and the United States. The founding of a francophone northern research centre was a desirable objective for the new Lesage government as it proceeded with the Quiet Revolution for the benefit of Québécois society. Northern research continues to this day with an unequalled intensity, given the anticipated riches of northern resources and the increase in economic development that will likely come as climate warming continues to melt the Arctic Ocean ice (Stroeve *et al.*, 2007).

Northern research following the Second World War

The world went through profound changes after World War Two, not only economically as regards the exploitation of natural resources, the environment, and technological development (Crutzen and Steffen, 2003), but also in terms of the new frontiers that opened up in the North well after the North American West had been populated. Aside from the Royal Canadian Mounted Police, Anglican and Catholic missionaries and Hudson's Bay Company merchants, the Canadian North had long been a free, some would even say abandoned, territory far from the reach of government control (Morantz, 2010). Following the creation of the Ministry of Northern Affairs in 1953, the first federal government officials began to visit Aboriginal camps, Inuit camps in particular, and found there great misery and devastating famine. This led the government to invest in infrastructure and social programs to support northern peoples

(Bonesteel, 2006). Québec, one of the few Canadian provinces with a North, closely followed the federal government's actions in the northern regions and, when the Lesage government came to power in the early 1960s, made clear its intention to develop Northern Québec, first for the benefit of its inhabitants, and then in terms of resources. It was in that light that René Lévesque, who was at that time Minister of hydraulic resources and public works and later became Prime Minister of Québec, saw the value of better understanding the North and its landscapes, inhabitants, and resources. CEN was created at just this point to ensure the presence of francophone scientists in the circumpolar regions, particularly in Northern Québec, which until that point, remained one of the least understood of all the northern regions, particularly compared to Northern Europe and Alaska.

Structured northern research (meaning, research planned by mandated institutions) had got to a cautious start in the 1950s in Canada and the United States in order to address geopolitical questions of national interest. These issues continue to generate the keen interest in the circumpolar North that we continue to see to this day. The Cold War, which culminated in the 1950s, indirectly influenced the establishment of small research centres. Among them was the McGill Centre for Northern Studies and Research, which was founded in 1954 and was equipped with a station in Schefferville. Accessible by railroad, the Subarctic Research Station was located next to the airport and served as a meteorological station and assisted air traffic. A radar post for the Mid-Canada Line project was then established in this area, which was experiencing a high degree of economic activity since the Maurice Duplessis government had granted rich iron deposits there to the Iron Ore Company of Canada. The Schefferville radar post was similar to 90 other posts that were installed along the 55th parallel for the Mid-Canada Line project. Developed in 1951 but only made operational in 1958, this was an aerial line of defence south of the DEW line (Distant Early Warning Line). Its purpose was to protect the country from apprehended air-borne invasions originating from the Soviet Union (USSR). The DEW line was set near the 69th parallel. As well as being the most northern of the three radar lines deployed by the Canadian and United States governments, it would be the most effective at signalling any eventual invasion of Soviet bombers. Given the rate of the USSR's post war technological progress, the Mid-Canada Line project quickly became obsolete and was never actually fully operational. It was abandoned in 1964. The village of Kuujuaapik-Whapmagoostui, which encompasses an Inuit and a Cree community in Northern Québec,

and where CEN has maintained a research station since 1968, was founded in 1954 as a result of military activity related to the Mid-Canada Line air defence program. The post war context and the Cold War between the USSR and the western world during the 1950s led to the creation of a number of northern villages in Canada and to the accelerated development of others, hastening in the process a shift among northern populations to a sedentary life. The geopolitical context linking together post war era northern countries, combined with the emergence of national defence systems in Northern Canada was an opportunity for the Canadian government to develop an understanding of Aboriginal populations and the difficult state of poverty in which they were living.

Many institutions, centres, and research groups were started in universities and federal ministries starting in the 1950s and 60s to develop scientific exploration and research programs in the North. The lifespan of these groups varied, and although there is an even greater number of them today than ever before, few of them can pride themselves on a history that spans more than one or two decades. Only the Arctic Institute of North America (AINA), which was founded in 1945 and is now located on the campus of the University of Calgary in Alberta (but which was based at McGill University between 1945 and 1976) and the Canadian Circumpolar Institute (CCI), which was founded in 1960 and located on the University of Alberta campus in Edmonton (and known as the Boreal Institute between 1960 and 1990) are older than CEN. However, they operated under very different mandates and do not appear to have gone through the challenging test of submitting an integrated scientific program to national and international funding competitions aside from the Natural Sciences and Engineering Research Council of Canada's (NSERC) major facilities access grants program and other programs for infrastructure. The mission of AINA is to facilitate and share the results of research conducted in the North (through, for example, the journal *Arctic*). The CCI limits its activities to the University of Alberta, where its goal is to promote and encourage research and education in the circumpolar regions, for the benefit of universities, northern populations, governments, industry, and the public. Another important participant in northern research in Canada appeared in 1958 in response to the space race that followed the Soviet's 1957 Sputnik satellite launch, which was yet another external pressure originating in the USSR that led Canada to adopt a policy of scientific exploration in the Canadian Arctic. Known at first as the Polar Continental Shelf Project, the Polar Continental Shelf

Program (PCSP) is a logistical and financial federal support program for Canadian and overseas researchers studying the arctic continental plateau. However, apart from a few exceptional situations such as research conducted by the Geological Survey of Canada, northern Québec has not been included in this program.

CEN's first decade

In 1961, CEN had two main objectives: 1) the pursuit of general research on a number of issues, problems, and regions in the North (northern Québec in particular); 2) the distribution of research results through a publication centre and an information and documentation centre, a goal which was inspired in part by the documentation practices of AINA. CEN started out its long life as a multi-faculty centre, and it remains so today, with members from both the social sciences and natural sciences working in different disciplines and faculties. In the 1960s, CEN benefited from an operating subsidy from the *Direction générale du Nouveau-Québec* (DGNQ), a governmental organization created in 1963 by ministerial order. The DGNQ was responsible for administering and developing northern Québec, excluding issues that were the responsibility of departments of justice, lands and forests. In 1978, the DGNQ was connected with the Executive Counsel and became the *Secrétariat des activités gouvernementales en milieu amérindien et inuit* (SAGMAI). Since 1987, the organization has been known as the *Secrétariat aux affaires autochtones* and has collaborated with First Nations and Inuit organizations in facilitating access to government programs. Apart from individual grants provided by NSERC, which were very small scale and not well suited to working situations in the Sub-arctic and Arctic, northern research was not the subject of any particular grants – making the DGNQ grants provided to CEN in the 1960s all the more crucial. Although logistics in the Québec Arctic are as difficult and expensive to organize as in the rest of the Canadian Arctic, the services provided by PCSP were not available to researchers working in Québec, as mentioned above. This situation has not changed despite a half century of presence and renowned research activity. Fortunately, the situation was different when it came to the concrete commitment of the *Northern Scientific Training Program* (NSTP). Founded in 1961 (the same year as CEN!), NSTP was the fortunate creation of Indian and Northern Affairs Canada (INAC) and remains to this day an excellent Government of Canada initiative to stimulate

northern research among the new generation of scientists coming up through the universities at the bachelor, masters, and doctorate levels. NSTP is mandated to promote science and technology development in the Canadian North. Its primary objective is to support northern studies and provide Canadian university students with the means to pursue scientific work in the circumpolar north, not only in Canada, but also elsewhere, such as Greenland, Scandinavia, and Siberia. Despite the modest sums allowed each student, the contribution made by the NSTP to northern research is crucial, particularly in the fields of human and social sciences where both funding sources and the sums of money awarded are still well below those available to natural sciences researchers.

When it was founded, CEN included few experienced researchers aside from a small number of graduates who held doctorates in geomorphology or natural sciences about the Canadian North (such as the geographer, Benoît Robitaille), but according to Hamelin, the organization was determined to make up for a 15-year delay in the northern regions of Québec (Côté, 1963). In its early days, CEN was primarily a documentation centre that circulated research results at a time when very few researchers spent time in the field in Northern Québec and Canada. Paradoxically enough, aside from a few master's students from the Geography Department, the first CEN researchers to be interested in doing field work in northern Québec were from outside Université Laval, notably from Europe (France, Switzerland, and sometimes the USSR) and elsewhere in Québec (such as the botanist, Albert Legault who was from the Université de Sherbrooke). Jacques Rousseau, an eminent botanist and fieldwork ethnologist (Laverdière and Carette, 1999), was already heavily involved in northern research before becoming a CEN member in 1962. After a short stint as Director of the Museum of Man in Ottawa, Ontario from 1956 to 1959, then another at the *Centre d'études arctiques et finno-scandinaves de la Sorbonne* in Paris, Rousseau returned to CEN, bringing with him in his wake Thomas Lee, a non-conformist archaeologist who had also worked at the Museum of Man. With a few physical geographers and botanists, Rousseau, Legault, and Lee began active research at Payne Lake, the largest lake in the Québec Arctic region, and at a few sites in the Ungava peninsula at the instigation of CEN, which had by that time already deployed one of its first multidisciplinary teams. Lee's research on 'long houses' and particular artefacts found at Payne Lake (1966; 1968) aroused and continue to arouse interest and scepticism. The theory that they are proof of a Norse presence at a location outside the area that was commonly

frequented by the Vikings during the period of Norse explorations of Greenland and the surrounding regions (Mowat, 1999; Diamond, 2005) was much debated. In 1964, Lee described the Cartier archaeological site at Payne Lake, where he found an artefact presumably of Norse origin, evocatively naming it *Hammer of Thor*, but which other archaeologists have since attributed to the Inuit culture. In his popular book, Mowat (1999) made use of Lee's discoveries to back up the hypothesis of colonization of North America by ancient European people. Rousseau, who was a scientific explorer of the calibre of the geologist and accomplished naturalist Albert Peter Low, an explorer in the early days of the Canadian Geological Commission at the end of the 19th century (Caron, 1965). Rousseau had gone on long summer botanical explorations along the great rivers of Northern Québec a few decades before he went on his final expedition in the Québec Arctic region at Payne Lake in 1965. Unfortunately, his failing health prevented him from starting any new research when he accompanied Legault and a few students who were completing their master's theses in physical geography.

The arrival of the retired French geologist and naturalist André Cailleux at CEN in the 1960s encouraged the launch of the first research program focused on the description of geological, geomorphological, and biogeographic characteristics of the east coast of Hudson Bay (the Hudsonic project, started in 1967) as the little CEN research station at Poste-de-la-Baleine (the village previously called Great Whale River and now known as Kuujuaapik-Whapmagoostui) was opened. Floristic inventories were made at a number of coastal villages, among them Puvirnituq, in the Québec Arctic region, where the French botanist Marcel Bournérias (1971) collected a large number of Arctic and Arctic-alpine specimens. Field researchers gradually started to appear at the end of the 1960s on the coast of Hudson Bay following the projects at Payne Lake and locations in the region surrounding Ungava Bay such as Kuujuaq (called Fort-Chimo at that time). The field of climatology saw considerable growth at CEN with the meticulous research of Cynthia Wilson, who did years of field work, in winter and summer, in the Kuujuaapik-Whapmagoostui region during the centre's first two decades. The *Atlas climatique du Québec nordique*, a monumental work for that time, was published by CEN thanks to the work of Wilson and her collaborators (Wilson, 1971).

Despite all that's been said and written, little systematic work in human and social sciences was done on the ground at that time. Although it is not really attributable to CEN, the best-known work by

far is that of Henri Dorion (1962), who completed his Master's thesis on the Québec-Newfoundland border just as CEN was founded. Several professors who were CEN members taught courses on the North, mostly at the University, but also on television and radio (Hamelin, 1996). In his ten-year report, Hamelin (1971), who assigned a great deal of importance to the sum of reports and articles produced yearly, estimated that 10,000 pages of work had been published at CEN over that short period of time. A number of theses, dissertations, monographs, books, activity reports, and a few articles in specialized journals made up a long list of events over the centre's first ten years: a solid foundation to CEN, which was in need of it, as it looked towards its second decade with some uncertainty.

CEN's second decade

With the departure of the first director in 1972, CEN started a long, difficult transition period that lasted until the early 1980s. The 1970s was a time of profound change for the administration, and for the organisation and financing of research in Québec and Canada. First off, the foundation of a network of Québécois universities (Universités du Québec, or UQ) in 1968 led to the creation of many new positions for professors, some of which were for northern researchers, particularly at UQAM (Université du Québec à Montréal) and UQAC (Université du Québec à Chicoutimi). Structured research found a permanent place in Québec when in 1970, the Québec government started a training program for researchers and joint projects that was then known as FCAC (and which later became the Fonds FCAC in 1981). This was followed by the creation of the Fonds pour la formation de chercheurs et l'aide à la recherche (known by the acronym, FCAR) in 1983-1984. The FCAC, which was independent in its interests and management, became a funding body that offered grants similar to the federal government's research funding, with the difference that their funding targeted groups of researchers. It was during this constructive, fertile period that the first research teams and centres were established in Québec under the aegis of FCAC. Over the years, FCAC became a major granting body in Québec that complemented federal organizations such as NSERC and SSHRC (Social Sciences and Humanities Research Council). Through its grant competitions, it encouraged the establishment of structured research teams and centres, and as a result was actively involved in promoting university research in Québec and the emergence of researchers

accustomed to participating in national and international competitions. As of 1970, the FCAC program enabled the creation of many research centres, among them the Centre d'ingénierie nordique de l'École polytechnique (CINEP), directed by engineering physicist Branko Ladanyi. The following year, another northern research centre, the Centre de recherche sur le développement du Moyen-Nord, was founded at the Université du Québec à Chicoutimi (UQAC) under the direction of Robert Bergeron, a geologist who had been a member of the CEN Board of Directors in 1961. Consequently, from that point on, the 10-year old CEN was in direct competition with numerous emerging centres that were all vying for a slice of FCAC's funding in the context of structured research in Québec. With the addition of the McGill Subarctic Research Centre to the three preceding centres, four research centres devoted to northern studies existed in Québec throughout the 1970s as a direct consequence of the increase in university research, not just throughout Québec, but also Canada, where northern research was blossoming. With the growing number of university research centres dedicated to the North, not to mention all the personal initiatives of researchers across the country, it looked as though this decade belonged to the North. It was also a time when new organizational structures were being established. For example, in 1978, Indian and Northern Affairs Canada established the Association of Canadian Universities for Northern Studies (ACUNS), a non-profit pan-Canadian organization devoted to advancing northern studies that every Canadian university that had northern researchers on staff was strongly encouraged to join (and pay membership fees to). There was in the air a certain amount of ambivalence as to the relevance of ACUNS, as this was an organisation that would inevitably draw part of its annual budget from the DIAND funding reserved for northern research, specifically through the NSTP. The biannual students' meeting that brings together students working on Northern issues from every Canadian university remains one of the best initiatives brought about by ACUNS. Paradoxically, however, the increase in the number of northern research centres throughout that decade was not correlated with a corresponding increase in the number of active researchers in the North.

For several years, those in charge of northern research centres in Québec, or their representatives, met and discussed common points of interest such as scientific documentation centres. Although scientists accustomed to 21st century approaches and methods might not instantly recognize the value of such

centres, it might be said that they sprung from a literary tradition that influenced discussions among most researchers in the human and social sciences at that time. The Government of Québec requested that the four northern research centres and AINA cooperate in sharing available documentation resources at the libraries of participating universities. The Government of Québec advised the AINA directors that it intended to declare its library “Cultural Property” in order to keep this documentation in Québec. Unfortunately, AINA, which had been generously funded by McGill University and the Québec Government, let Québec down in 1976, when, after having been located on the McGill campus for over three decades, it moved its entire collection (60,000 documents) to the University of Calgary campus (MacDonald, 2005). According to malicious gossip, this change of address was precipitated by the coming to power of the Parti Québécois in 1976. Others ascribed to the theory that the oil industry had drawn AINA to Calgary. The President of the Board of Directors of AINA who had been tasked with recommending to the Board a new location for the headquarters of the institute was none other than the vice-president of the petroleum company Panarctic Oils (Love, 1987). This dealt a blow to AINA’s reputation.

The research conducted at CEN in the first half of the 1970s was led by its new director, Roger Le Jeune, a biologist who was well known by the DGNQ and who was particularly interested in the exploitation of natural resources. Not everyone was pleased with his nomination as CEN Director, but it must be understood that at this time, the number of up and coming academics who would be both willing and able to direct a university research centre such as CEN were simply not in great supply. Le Jeune was an energetic director who had helped establish a muskox (*Ovibos moschatus*) farm in the late 1960s at what was then known as Vieux-Chimo (now called Umingmagautik) on the shore of the Koksoak River. At the time, CEN maintained a small research station at the top of the hill overlooking the village. Le Jeune was in favour of multidisciplinary research, and encouraged the study of archaeology, socio-economics, anthropology, geology, and biology. Alongside André Cailleux, he ensured the continuation of the Hudsonie project, which involved several masters and doctoral students. One of these teams was directed by the geochemist, Claude Hillaire-Marcel, now an eminent researcher at UQAM and the founder of GÉOTOP (Centre de recherche en géochimie et en géodynamique), whose doctoral thesis explored the most significant example of post-glacial isostatic rebound in the world, proof of which was discovered in fossils found around Hudson

Bay at over 250 m above current sea level (Hillaire-Marcel, 1977). Ecologist and geographer Serge Payette’s natural sciences research team was the only CEN team to have lasted the decade. His team worked at Lac Guillaume-Delisle Lake, Minto Lake, and the Rivière-aux-Feuilles research camps and completed several research projects at Kuujuaapik-Whapmagoostui and Monts Torngat (Labrador) from the CEN station in Kuujuaq. Also during this period, Maurice Seguin, a geophysicist hardened to the rigors of wilderness camps, participated in annual CEN missions in Northern Québec. Payette’s team set up winter camps along the coast of the Hudson Bay, at Richmond Gulf (Lac Guillaume-Delisle), and along the Nastapoka River in close collaboration with the Inuit of Kuujuaapik at a time when research was done by snowmobile, boat, and on foot.

Financing research at CEN became problematic over the course of the second half of the decade. In the face of new FCAC funding requirements, it was difficult to define an original research topic. It must be noted that CEN had not, over its first 10 years of existence, developed a clear, focused research program, because it apparently was not expected in those days. The research culture that had taken hold at CEN was multidisciplinary: it integrated human and social sciences research practices with those of natural sciences, but this was more the case on paper than in reality. The dynamics of human sciences research, which had been increasingly marginalized at CEN, at least regarding anthropology in the Inuit environment, found concrete expression in 1977 when the journal, *Inuit Studies* was established at Laval University in collaboration with CEN, thanks to the work of Bernard Saladin d’Anglure.

Le Jeune left CEN in 1977 and was replaced as director by Robert Héroux, a physical geographer and professor at the Faculté de foresterie et de géomatique (Faculty of forestry and geomatics), although the selection committee had recommended another candidate who was not a professor at Laval University. With an enthusiasm that made up for a lack of experience in northern research, the new director attempted to unite CEN’s driving forces around key issues. This was a difficult task, as profound differences in cultural practices separated researchers from the human and natural sciences. An ideal opportunity to bring together researchers from these two fields arose in 1978 when the Office de planification et de développement du Québec (OPDQ) awarded CEN a large contract to create a geographic atlas of Northern Québec. The project involved assembling all information pertaining to Northern Québec on demographic, sociocultural, economic, geographic, as well as geological, climatic and biogeographical aspects. This information was to

be presented in the form of tables and maps. However, an imbroglio around university administration's refusal to pay CEN for indirect costs connected with the project led the director to cancel the contract and resign, plunging the centre into an unprecedented existential crisis. The contract was then offered to the Centre de recherche sur le développement du Moyen-Nord at UQAC, which carried out the work in close consultation with several CEN researchers. The situation at CEN was more precarious than ever, and some of the main actors on the university and governmental scenes were predicting its unfortunate end in the short-term. The Vice-President of Research at Université Laval ordered a university commission to evaluate the situation and propose solutions that would address CEN's organizational structure and future. The Cardinal Commission (named for its president, André Cardinal, a professor in the Biology Department) was conservative in its critical analysis of the situation at CEN, and recommended that the structure be maintained as it was before the last director's resignation. In 1979, the Vice-Rector of Research accepted the committee's recommendations and, exceptionally, asked Serge Payette to take on the responsibility of managing CEN, with the hope that the centre would experience a renaissance and regain its position as a leader of funded research in Québec. At the end of the decade, a dearth of new scientists and seasoned researchers, as well as limited research funds, created conditions that would have likely led to the end of CEN - had it not been for the unfailing support of Université Laval, which believed in a new beginning for CEN. This, in fact, is exactly what CEN's third decade brought about!

CEN's third decade

Despite the gloom of the moment, CEN's 20th anniversary was celebrated in a novel way with an international symposium on northern treeline held at its Kuujuaapik-Whapmagoostui station in June and July, 1981. The 1980s saw CEN spare no effort in redefining its research goals and sparking increased productivity. At the beginning of Serge Payette's mandate as Director, CEN was called upon to redefine its development and research plan, which included from that point on the integrated study of natural ecosystems and use of renewable resources to the benefit of northern populations. Thus, CEN turned away from the 'globalism of yesteryear' and towards more circumscribed fields of research. This redefinition was necessary to the survival of CEN, which had been denied an FCAC-centre grant over

the period 1980-1983. At this time, the Commission de la recherche universitaire (CRU) of the Ministère de l'Éducation du Québec had put in place a working committee that was mandated to evaluate university northern research centres in Québec. According to CRU, there were apparently too many such centres (besides CEN, there were at that time CINEP at the École Polytechnique de l'Université de Montréal, CERN at McGill, and CRMN at UQAC) with poorly defined research goals. In reality, this was not the case, as CEN had already concentrated its efforts on the natural sciences and the development of natural resources, while the CINEP was exclusively dedicated to the geotechnical aspects of cold environments, and the two other centres were focused on human sciences research.

Over the course of the 1980-1981 exercise, CEN's directing body devoted much energy to clarifying the situation within its two broad fields of research, namely natural sciences and human sciences, with the goal of affirming the will of its human sciences researchers to being involved with the scientific life of CEN. For months, the Directors's office tried in vain to revive the interest of the human science researchers, but little by little they left CEN, even though there had never been any question of excluding them. CEN's orientation towards the natural sciences eventually led to the creation in 1987 of GÉTIC (Groupe d'études inuit et circumpolaires), a centre focused on the study of northern peoples at Université Laval. In 2004, the GÉTIC expanded its field of research to cover a broader geographic scope and changed its name to the Centre interuniversitaire d'études et de recherches autochtones (CIÉRA).

The significant consolidation of natural sciences research at CEN would be coupled with the interest of a number of researchers from other Québécois universities, among them the Université de Montréal and the Université du Québec à Trois-Rivières, Chicoutimi and Rimouski, to join CEN, increasing the centre's staff and resources. This became the occasion for CEN to redefine its membership by insisting on scientific productivity criteria from then on. To this end, a new policy was established to stimulate productivity by offering grants to graduate students to encourage participation in scientific conventions and publication of research results in peer-reviewed journals. These decisions had a long-term effect on the scientific productivity of CEN researchers.

The collection of data from direct observation in the northern environment has always been an important part of scientific discovery at CEN. Over

the course of this decade, CEN acquired the means of developing a northern infrastructure that would significantly increase its field research activities. New seasonal research camps were established, for example at Lac à l'Eau-Claire, the Boniface River at the northern tree line, and at Bylot Island in the Canadian High-Arctic. The main CEN research station at Kuujuaapik-Whapmagoostui was also renovated and expanded with an infrastructure grant provided by the OPDQ (Office de Planification et de Développement du Québec) and Université Laval. This was the beginning of what would become a veritable network of research stations devoted to Sub-arctic and Arctic environments. The efforts that went into establishing this infrastructure had a stimulating effect on research. Proof of this can be seen in the fact that the areas surrounding the Boniface camp became one of the most studied Sub-arctic regions in the world. CEN research infrastructure in northern Québec motivated scientists from other countries, in particular Finland, France, and the United States, to visit its stations. The early 1980s also saw the creation of new laboratories at CEN headquarters on the Université Laval campus. Under the direction of Louise Filion, the dendrochronology laboratory was created in 1983 and has become one of the jewels in the crown of CEN research. The same can be said of the radiochronology laboratory (which at first used radiocarbon dating, and much later added the isotopic analysis of radioactive lead) that was created the same year under the direction of Michel Allard through an infrastructure agreement with the Ministère des Ressources naturelles du Québec. These laboratories were primarily meant to support CEN's up and coming research in geomorphology, ecology, and paleoecology, all of which depend on dating technology. The temporal spectrum of these two laboratories made it possible to date organisms and organic materials on a scale ranging from years (dating tree rings from trees and shrubs) to centuries and millennia (carbon 14 dating). The year 1984 also saw the implementation of the CEN telemetry network that came to be known in the 2000s as the SILA network (meaning 'climate' in Inuktitut).

These laboratories, along with the terrestrial paleoecology and paleolimnology laboratories established between 1997 and 1999, are more active than ever in 2011. They have permitted many CEN researchers to develop new analysis methods and take on complex research topics, thus gaining unique expertise in dendroecology and quaternary paleoecology. A research program centred on northern environmental patterns and processes, policies that increased scientific productivity among CEN members, and the accelerated development of research infrastructures equipped with cutting edge

research tools progressively reinforced CEN research, and were rewarded with an infrastructure grant from the FCAR centre program. In the year 1983-1984, CEN also received an NSERC infrastructure grant, essential funding that was needed to maintain the Kuujuaapik-Whapmagoostui research station that has been maintained to this day. That year, CEN decided to close its small, infrequently used station at Kuujuaq, since a large investment of over \$50 000 at the currency rate of the time would have been required to bring it to acceptable standards. After several years of preparation, restoration, and growth, the Kuujuaapik-Whapmagoostui research station, which included an experimental greenhouse, was completed in 1987. Over the course of that year Louise Filion took over as CEN Director for five years. In 1988, Gilles Gauthier, a professor in the Biology Department, joined CEN, which led to the development of one of CEN's most beautiful and productive research stations, on Bylot Island (north of Baffin Island) where the Canadian Wildlife Service had been tracking the snow goose population for many years. By implementing itself on Bylot Island, CEN set out on its development in the Canadian High-Arctic where research was intensifying due to the growing numbers of Canadian researchers and new funding programs for northern research. The 1980s was therefore the period during which CEN was completely redefined and restructured. Its interuniversity vocation was reaffirmed as a growing number of researchers from other universities in Québec, many of them from UQAR, became CEN members. These members went on to play a constructive role in CEN research over the years, particularly in dynamic geomorphology, forest ecology, and animal ecology.

CEN's fourth decade

In the early 1990s, the context of research in northern regions underwent further profound transformations, in particular following the disappearance of certain federal programs that had traditionally supported it, such as the Natural Resources Canada Research Agreements Program, which some researchers had come to depend upon. This disruption forced scientists to find other means of pursuing their research and to rethink their scientific approach. After the departure of Louise Filion, who was named Vice President of the Canadian Polar Commission (1991-1994) and President of the Research Commission at Université Laval (1992-1995), the geomorphologist Michel Allard, professor in the Geography Department at Université Laval, took over as CEN Director from 1992 to 1996. The advancements made in previous

years were well maintained and put to good use thanks to the constant efforts of the Director, who in 1995, won CEN a new NSERC major facilities access grant. This grant allowed CEN to support logistics and research operations at its Kuujuaapik-Whapmagoostui research station. “Beyond recognizing the station itself, the selection committee emphasized their respect for the research team’s work and its future potential. The station won recognition as an important northern research facility in the Canadian North-East. The grant made it possible to anticipate a promising future for the station as an ideal facility for interested researchers from every discipline and as a site for activities of international significance.” (From the CEN 1995-1996 annual report [translation].)

When Michel Allard’s mandate was completed, Serge Payette returned and held the post of Director until 2000. This was an auspicious period for research at CEN, which was benefiting in those days from stable financing thanks to the hard work of the two preceding directors, and despite the relatively modest size of its research team. The team’s relatively small size had the positive effect of encouraging multidisciplinary collaboration. As a matter of fact, CEN’s research productivity, despite the small number of researchers was reflected in a 1997 study by AUCEN, which revealed that at least 10% of all research activities by Canadian universities in Northern Canada were conducted by researchers from Université Laval (annual report NSTP 1996-97). Thanks in part to the recruiting efforts of Louise Filion, over the course of this decade CEN welcomed several researchers who would become major actors at CEN: notably the limnologist Warwick F. Vincent, current CEN Director and one of the most active scientists in the polar world; and the paleolimnologist, Reinhard Pienitz, a dynamic researcher who directs a team that is renowned for its productivity.

Over the course of this decade, CEN hosted important national and international colloquia, notably on the topics of dendroecology (1993), peatland restoration (1994), and the dynamics of permafrost (see below). In June 1990, the 5th Canadian Permafrost Conference brought international researchers to Québec, among them a large contingent from Russia. In March 1995, the 25th Arctic Workshop was held at Université Laval in partnership with the Institute of Arctic and Alpine Research (INSTAAR) at the University of Colorado. In July 1998, CEN’s Kuujuaapik-Whapmagoostui station and camp at Boniface River welcomed an excursion group of the 7th International Permafrost

Conference. This excursion was the impetus for a seven-year collaboration on permafrost research with the BGR of Germany at the village of Umiujaq.

One of the main endemic problems with which CEN continued to be confronted over the course of the 1990s was the small number of researchers interested in doing active, sustained research in the Canadian North. This problem, which had already been encountered in the 1980s, was stressed on numerous occasions by the FCAR-centre selection committees, who recommended that new researchers be admitted. When it was announced in the late 1990s that the FCAR grants would be restructured, the new definition of research centres would result in profound changes in the structure of CEN at the dawn of the 21st century.

CEN’s fifth decade

The new millennium began at CEN with the appointment of a new director in June 2000: Yves Bégin, a biogeographer and professor in the Geography Department at Université Laval. At that point the Director was faced with new challenges, as the Government of Québec had just completely restructured its granting bodies. Notably, the Fonds FCAR had been transformed into a new funding body, the Fonds québécois de Recherche sur la Nature et les Technologies (FQRNT). The program for research centres was then changed into a program for strategic groups that stipulated that research centres meet new structural requirements. Previously, centres had a few dozen researchers. The minimum number went up to 50 or more, the idea being that research centres financed by the Government of Québec should be equivalent in size to international teams capable of successfully managing large-scale multidisciplinary projects. The new program also encouraged all northern studies researchers in Québec to come together under one single banner, and led to the joint executive team that is now implemented with the two current directors, Warwick Vincent of Université Laval and Monique Bernier of the Institut national de la recherche scientifique (INRS). Thanks to sustained efforts, CEN saw a particularly pronounced growth in membership from almost every university in Québec. This led CEN to review its research management practices, its organizational structure, and its partnerships. Although CEN had been part of a network of recognized centres since the early 1980s, it had not undergone any significant change and had not changed its name, but had continued to consolidate and build on its interuniversity vocation. This made it possible for the

center to obtain a FQRNT “strategic clusters” and also a “major facilities” grant for the maintenance of the Kuujuaapik-Whapmagoostui research station that would be renewable in six years. The peer recognition that this major grant brought with it was also strategically advantageous, as it placed Québec in a favourable position within the network of large research organizations in the circumpolar world as a large scale, well-financed organization with a broad range of research topics and a significant publishing and training record in the field of northern studies. Canada would be in need of this expertise in the years to come. CEN was also awarded a grant of \$1.25 M in 2002 by the Ministère de la Recherche, de la Science et de la Technologie du Québec in order to create a northern network of climate and environmental change observatories. Spread out from the Boreal forest to the High Arctic, today these observation stations collect instrumental data on the characteristics of permafrost, tree growth, and hydrological and limnological conditions. CEN members continued to organize major international conferences over the course of the first decade of the 21st century, such as the 6th International Dendrochronology Conference in 2002, the 5th International Deer Biology Congress in 2002, and the 1st International Workshop on Deer-Forest Relationships in 2005.

In September 2000, NSERC submitted a report that put forth a plan to revive research in northern Canada (Task Force on Northern Research, 2000). This report followed numerous criticisms from the university research community regarding underfunding and the pronounced weakening of Canadian leadership in international northern research. The working group on northern research made the following recommendations with the aim of re-establishing Canada’s role as a primary actor in northern research: (i) create university research chairs in northern research, (ii) establish graduate and postdoctoral study grants in northern research, (iii) develop research projects in the North, (iv) forge research partnerships among northern and university communities, and (v) increase support for the acquisition of equipment and research infrastructures along with increased logistics assistance. Over the course of the decade, these recommendations led to concrete actions that affected CEN. Of note, Serge Payette won one of the six Canada Northern Research Chairs. Thanks to the diligent work of its director, CEN also won a large grant from the Canadian Foundation for Innovation (CFI) in 2006. That, along with a grant from the Government of Québec, allowed it to invest in research infrastructure at the Kuujuaapik-Whapmagoostui station and in the development the SILA network.

The turn of the century brought with it new Canadian research support programs with strategic mandates. These programs, for example, the cooperative programs run by NSERC, the Canadian Foundation for Climate and Atmospheric Sciences, the Canadian Foundation for Innovation, the Canada Research Chairs, NSERC Industrial Research Chairs, the Networks of Centres of Excellence, the International Polar Year, the Ouranos Consortium on Climate Change, the Climate Change Action Fund, industry grants, etc., often had a limited duration of a few years and encouraged co-financing partnerships with the industrial and public sectors. All these programs are used by CEN researchers in conjunction with NSERC and FQRNT grants to supplement their financing, and in this way support an increased number of graduate students. The understood usefulness of research, the sharing of research between partners, consultations with aboriginal communities, and international collaborations are all significant considerations in the granting of these funds. Their overall management in a strategic group also creates the need for more coordination personnel.

Launched in 2004, the ArcticNet Network of Centres of Excellence of Canada is based at Université Laval. Its creation represented a good occasion for many CEN researchers to breath new life into their research programs. In fact, this access to new federal funding fuelled the development of research projects in the North that would not otherwise have seen the light of day. This money increased the grantees’ possibilities. The opportunity to participate in scientific missions onboard the ice-breaker Amundsen allowed CEN graduate students the chance to travel through northern Québec and Canada while acquiring a unique research experience. The arrival of ArcticNet also made it possible for Université Laval, who now housed, in addition to CEN and CIÉRA, a new Centre for Inuit Health and Changing Environments (Nasivvik) and Québec-Océan, whose interests include the study of cold-water marine ecosystems, to realize the importance of the northern research that was being conducted within its walls. In that light, it is not surprising that northern research plays an important part in the university’s overall strategic plan, as has been the case since CEN’s earliest days.

Yves Bégin left CEN to become the director of INRS Eau, Terre, Environnement Centre in 2007. His unexpected departure came at a time when CEN was going through another difficult period. Michel Allard stood as acting director from 2007 to 2008, and prepared a FQRNT grant proposal requesting the renewal of CEN’s infrastructure grant. As a first step in this process, CEN’s scientific program was reviewed by its regular members. CEN then began

another major restructuring process in 2008 under the aegis of a new management team. It was at this time that Warwick F. Vincent and Monique Bernier took over the direction of CEN. The FQRNT had recommended this division of the role between two directors, and that members from participating universities be more implicated in managing CEN's strategic clusters. While the management of CEN must be the responsibility of a member from Université Laval (given the university's monetary involvement and the fact that CEN headquarters have their statutory location on the Université Laval campus), this new management structure gave concrete evidence that CEN was definitively an interuniversity organisation.

CEN, which is now comprised of approximately 50 researchers, 20 research professionals and technicians, and close to 200 graduate students from nine of Québec's universities, has developed a wide international influence. Additionally, the CEN network includes all the climate stations within the SILA network, as well as the Qaujisarvik network of research stations. The network of climate and environmental change observatories that was implemented in 1984 now includes 80 automated stations that collect data on environmental variables throughout Québec and the Canadian High Arctic. In 2009, the CEN network joined the SCANNET network, an international group of circumpolar observation stations tracking environmental changes in the North. Founded in 2001 in Scandinavia, SCANNET is made up of managers and users of northern research infrastructures with the goal of supporting and facilitating comparative studies and long-term studies of environmental change in the circumpolar North. CEN in this way may further influence the international scene while benefiting from access programs at research stations within this network.

Thanks to an \$8.3M grant from the federal government's Arctic Research Infrastructure Fund (ARIF) obtained between 2009 and 2011, CEN had the unique opportunity to consolidate all of its research stations and create new ones that meet environmental standards and respect ecosystem integrity. Through this infrastructure grant, the important research on the dynamics of permafrost in natural and inhabited environments conducted by Michel Allard's and Richard Fortier's teams, was facilitated with the construction of two new buildings in the villages of Salluit and Umiujaq, two localities which are the object of extensive research on the behaviour of permafrost soils in the face of present climatic change. The ARIF grant in a way

supplemented the CFI grant that had been obtained a few years prior. Finally, one of the most recent CEN research infrastructure acquisitions (2011), thanks in part to the work of Patrick Lajeunesse, a professor in the Geography Department (Université Laval), is a small research vessel used for geophysics projects in the coastal and lacustrine zones. It was evocatively baptised *Louis-Edmond-Hamelin*, a historical tribute to the early origins of CEN's long existence.

Conclusions

In the increased amount of research conducted in Québec throughout the 1960s and 1970s we can see the distinct emergence of the first generation of university researchers to be affected by the democratization of education during the Quiet Revolution. The founding of CEN coincides with the beginning of structured research in Québec, the primary objective of which was to ensure a francophone scientific presence in the North. For 50 years, CEN has stood for the determined efforts on the part of Québécois academics to increase our knowledge and understanding of cold regions, northern regions in particular, and Northern Québec above all. Despite ongoing uncertainty in regards to funding for its research program and infrastructure, CEN's presence on the international northern research stage is more relevant than ever, particularly in the current geopolitical and social contexts, which increasingly underscore the importance of northern regions in regards to global environmental and economic change. Over the course of its first 50 years of existence, CEN has been able to adapt to many changes in the structure of research funding. It represents a model of success and of great adaptability to federal and provincial government research funding policies. The continued support of Université Laval and other institutions such as UQAR, and an approach that has been influenced by the changing but profound, judicious vision of Québécois (FCAC, FCAR, FQRNT) and Canadian (NSERC, SSHRC) funding bodies have led CEN to slowly but surely emerge as one of the most important northern research centres in the world. CEN has not had an easy life, as our commentary shows, but do our institutions ever really have an easy time of it? It is in the nature of our institutions to adapt to change and evolve harmoniously, echoing the Darwinian law of survival. The complex scale and structure of CEN in 2011, its many researchers, the high costs of northern research, and the maintenance

of its many infrastructures all demand extreme vigilance on the part of the researchers involved. It is hoped that on the strength of its long history and many lessons learned, and in the face of significant environmental changes in the North, CEN will continue in the decades to come, its quest for knowledge and training for the benefit of society at large and for those northern societies that are most sensitive to the profound socio-cultural shocks we see today.

Long live CEN!

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