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DIFFERENTIATING THE CANADIAN NORTH FOR COHERENT INFRASTRUCTURE DEVELOPMENT

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FOREWORD

THE CANADIAN NORTHERN CORRIDOR RESEARCH PROGRAM PAPER SERIES

This paper is part of a special series in *The School of Public Policy Publications*, investigating a concept that would connect the nation's southern infrastructure to a new series of corridors across middle and northern Canada. This paper is an output of the Canadian Northern Corridor Research Program.

The Canadian Northern Corridor Research Program at The School of Public Policy, University of Calgary, is the leading platform for information and analysis on the feasibility, desirability, and acceptability of a connected series of infrastructure corridors throughout Canada. Endorsed by the Senate of Canada, this work responds to the Council of the Federation's July 2019 call for informed discussion of pan-Canadian economic corridors as a key input to strengthening growth across Canada and "a strong, sustainable and environmentally responsible economy." This Research Program will benefit all Canadians, providing recommendations to advance the infrastructure planning and development process in Canada.

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Dr. Jennifer Winter
Program Director, Canadian Northern Corridor Research Program

DIFFERENTIATING THE CANADIAN NORTH FOR COHERENT INFRASTRUCTURE DEVELOPMENT

Katharina Koch

SUMMARY

Canada's northern and Arctic environment poses significant challenges for infrastructure development. The region is characterized by unique ecosystems, extreme climatic conditions and a sparse population, which are factors that have inhibited infrastructure development in the past. Nevertheless, various practitioners, academics and northerners have emphasized the need for reliable and safe connections between north and south and within the North. The lack of infrastructure is a major impediment to the well-being of northerners who lack access to essential services, such as clean drinking water (Patrick 2011) or safe and reliable roadways. Infrastructure Canada (2018) noted that the current southern-based "one-size fits all" northern infrastructure approach is inefficient because northern conditions and challenges often do not respond to policies that are conceived in the south. Currently, infrastructure projects are often conducted on a one-off basis without establishing broader connections in the northern region. Thus, this paper draws on the Canadian Northern Corridor (CNC) concept (Fellows et al. 2020) as a solution to deliver much-needed infrastructure to northern communities.

At the same time, this paper cautions that it is critical to recognize the diversity of the Canadian North and it is vital to consider northern Indigenous practices that can inform infrastructure development for a CNC. This paper offers a discussion of Canada's northern diversity by exploring the relevance of Hamelin's nordicity index (1979) as a policy tool to better understand and respond to the distinct challenges and opportunities across the Canadian North and Arctic. Although the CNC concept reflects a pan-Canadian approach, it strongly advocates for the recognition, participation and inclusion of all northern stake- and rights-holders to inform future infrastructure development and to avoid past mistakes. The CNC could thus offer a coherent northern infrastructure framework that addresses the shortcomings of made-in-Ottawa policies for the Canadian North and Arctic.

THE CHALLENGES OF CANADIAN NORTHERN INFRASTRUCTURE DEVELOPMENT

Infrastructure development in northern Canada is a challenge due to factors that include harsh climatic conditions, remoteness, environmental characteristics such as permafrost and a sparse population across vast distances (Rodrigue 2021). Large-scale northern infrastructure development has historically not been a priority on the federal policy agenda. One reason could relate to the argument that "seventy-five percent of Canada's population resides in a narrow 150-kilometre band pushing up against the U.S., with close ties south of the line" (Hillmer 2005, 3). In the 1960s and '70s, Richard Rohmer (1970) proposed a mid-Canada development corridor; however, due to a lack of public and private support, the project failed to gain momentum.

These factors have contributed to the lack of essential infrastructure in the Canadian North and Arctic, which has been highlighted as a major concern across various policy areas (CIRNAC 2019). A lack of physical infrastructure creates a north-south division between the population and contributes to a lack of prosperity in northern communities (Fellows et al. 2020). Furthermore, insufficient and outdated infrastructure causes major health concerns in northern communities. For example, the Nunavut chapter of the Arctic and Northern Policy Framework (ANPF) indicates several priority areas which need to be addressed to close the infrastructure gap: housing development and maintenance, adequate transportation, water, education and health facilities, broadband connectivity, reliable and sustainable energy supply and in-territory mental health and addictions infrastructure (Nunavut 2019).

While infrastructure development itself must proceed in a sustainable manner, Fellows et al. (2020) argue that northern Canadian infrastructure delivers spill-over effects which not only promote prosperity in northern communities but for Canada as a whole. However, northern Canadian infrastructure development continues to proceed in a piecemeal approach "in which projects are planned and implemented in isolation from one another and regulatory and governance frameworks are specifically designed for individual projects and their purposes" (Fellows et al. 2020, 9). As a possible solution, Fellows et al. (2020) propose a multimodal and pan-Canadian Northern Corridor (CNC) to enhance connectivity within and to the North. The CNC concept envisions the participation of various stake- and rights-holders at all stages of planning and development (Wright 2020). The inclusion of Indigenous rights-holders in any implementation stage of the CNC is crucial as they offer unique and relevant perspectives on the needs and challenges of development in the Canadian North.

The CNC envisions a co-ordinated northern and pan-Canadian multimodal infrastructure governance framework (Sulzenko and Koch 2020). At the same time, such encompassing governance approach must be cognizant of local conditions and challenges which underline the importance of including the experiences, perspectives and knowledge of Indigenous Peoples in order to reflect the diversity of Canada's North and to avoid a one-size-fits-all approach (Infrastructure Canada 2018). This paper presents some of the key challenges that have inhibited northern infrastructure

development before discussing the ways in which geographers and other academics have attempted to capture the complexity of the Canadian North for coherent policy-making. The CNC could be a potential solution by offering an encompassing infrastructure development framework while at the same time reflecting the unique and lived experiences and knowledge of northern and Indigenous inhabitants across the Canadian North and Arctic.

THE IMPORTANCE OF DIFFERENTIATING THE CANADIAN NORTH FOR COHERENT INFRASTRUCTURE DEVELOPMENT

The homogenous policy approach towards the Canadian North has already been criticized by Huebert (2014), who argued that "southern tendencies to lump northerners together as if they have all the same views, hopes, wishes, beliefs simply demonstrates that southerners are not willing to appreciate the true complexity and diversity of what the Canadian North has become." Policy-makers and academics are challenged to develop a differentiated understanding of the North which could translate into coherent policy approaches. However, this can only be achieved with the participation of northern stake- and rights-holders as they have attained critical knowledge, perspectives and views of local conditions and the key challenges their communities face, such as the impact of climate change (Ford et al. 2016).

Canadian northern infrastructure development has been limited due to a combination of factors related to its sparsely populated northern regions, complex engineering challenges, prohibitive costs and a lack of public awareness in the south. The results are that northerners lack economic opportunities and social infrastructure which has been taken for granted in the southern urban centres. This has also been recognized in Canada's 2019 Arctic and Northern Policy Framework (ANPF 2019):

> Canada recognizes that what has been done before has not succeeded in building a strong sustainable region where most people share in the opportunities expected by most Canadians. Insufficient physical and social infrastructure has hindered opportunities for growth and prosperity in the region.

Notably, Carolyn Bennett, the former minister of Crown-Indigenous Relations and Northern Affairs, stated that "our government recognizes 'made in Ottawa policies' have not been successful. The new approach puts the future into the hands of the people who live there to realize the promise of the Arctic and the North" (ANPF 2019). Canada's northern regions have unique geospatial characteristics based on differences in biodiversity, climate, ecosystems and landscape which challenge infrastructure development, as it cannot be implemented in a one-size-fits-all approach (Infrastructure Canada 2018). Furthermore, Indigenous commentators have criticized the lack of recognition of existing capacities in northern communities:

> To create a better North for our children, the focus needs to be on what forms of knowledge and skills exist within our communities and how the federal government can assist in building upon and supporting these strengths. This means focusing on what we have versus focusing on what we lack, and valuing our existing capacity over voices that tell us we are not capable (Dene Nahjo 2018, 12).

The quote shows that, to achieve a coherent infrastructure development approach that recognizes the unique conditions of the Canadian North and Arctic, the integration of Indigenous traditional knowledge (TEK) or Indigenous knowledge (IK), especially during impact assessments, is crucial (Arsenault et al. 2019; Eckert et al. 2020). The following section offers an overview of previous attempts to differentiate and define the Canadian North with the help of nordicity indices, before discussing the relevance of TEK and IK for infrastructure development.

NORDICITY INDICES AS A POLICY TOOL — OPPORTUNITIES AND SHORTCOMINGS

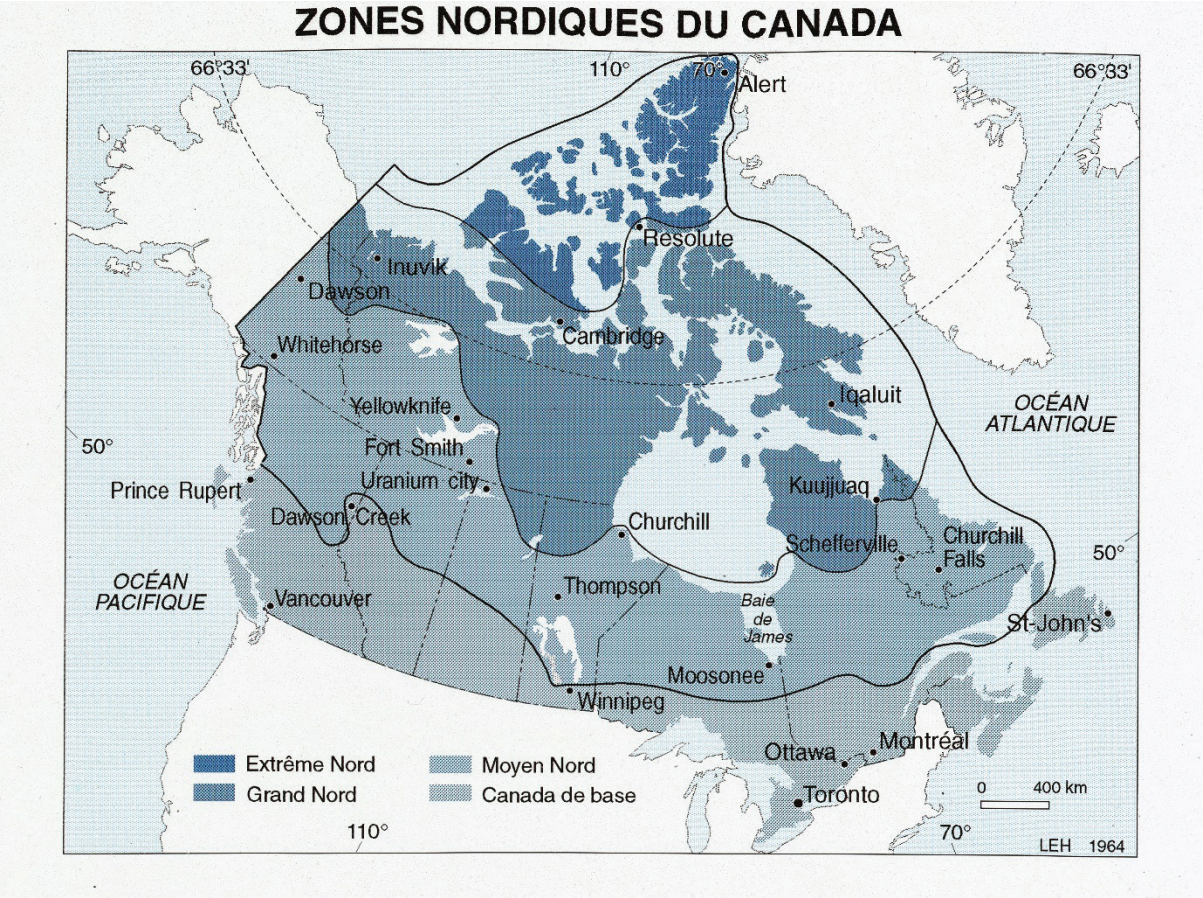
What makes nordicity indices appealing from an infrastructure perspective is that they aim to capture the specific environmental and socioeconomic conditions across Canada's northern and Arctic regions while emphasizing their diversity. Hamelin's (1979) original nordicity index and its categories assist in identifying environmental and socioeconomic key characteristics of northern and Arctic localities. This, in turn, will help identify the locations and types of bottlenecks that exist in the North which could impede sustainable infrastructure development.

Asselin (2013, 5) states that "limited efforts were made to define the Canadian North and to capture its geographical complexity" until geographer Louis-Edmond Hamelin (1979) developed the nordicity index during the 1960s and 1970s. As demand for labour in the Canadian North rapidly increased during the mid-20th century, for example in the emerging natural resource sector, the federal government introduced tax incentives and scaled benefit payments to attract workers from southern provinces. However, Hamelin determined that allowances lacked coherence, as they failed to consider the level of nordicity. Payments were determined by a level of hardship that would compensate for higher costs of living; however, Graham (1990) shows that these payments were applied across all regions considered remote, which was an inconsistent variable and included southern communities in the provinces, such as Vancouver Island. As a remedy, Hamelin developed the nordicity index to conceptualize "the state or quality of northernness or being north" (Hamelin cited in Jones-Imhotep 2009, 162). He aspired to quantify northernness through a "measure based on a number of criteria that would help distinguish between a nation's true nordicity and false claims to that title" (Jones-Imhotep 2009, 162).

Hamelin's nordicity index includes six environmental (latitude, summer heat, annual cold, types of ice, total precipitation, natural vegetation) and four socioeconomic (accessibility by means other than air, air service, population, degree

of economic activity) categories and is quantified on a scale from zero to 1,000 VAPO (valeurs polaires). Based on these values, he developed a map showing Canada's boundaries (or isonorths) of the extreme North, far North, middle North and base Canada (Figure 1). Hamelin's categories indicate that the Canadian North is a diverse region subject to environmental and human-made changes, as the index's values are volatile in accordance with environmental and socioeconomic transformations.

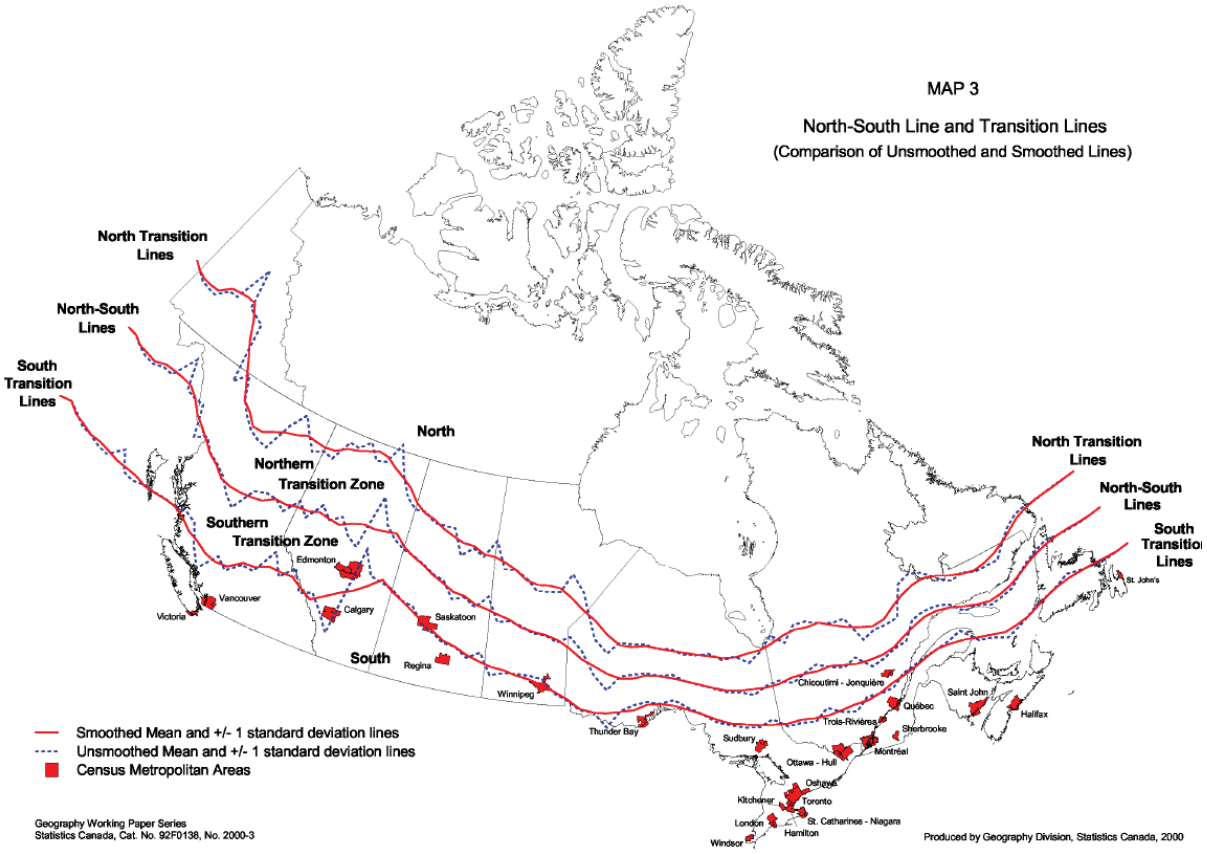
Figure 1. Carte Zones Nordique du Canada.



Source: Université de Laval, Division de la gestion des documents administratifs et des archives, Fonds Louis-Edmond Hamelin, P311/ G2,1, Carte Zones nordiques du Canada de Louis-Emond Hamelin, 1964. Image obtained with permission from University of Laval, Historical Document Archive.

Since the creation of Hamelin's nordicity index, scholars have constantly revised and extended its categories throughout the last decades. McNiven and Puderer (2000) offered a revision for Statistics Canada with the goal of providing a statistically robust framework for census enumeration. In this case, the authors used exclusively quantifiable categories for a geospatial representation of a north-south divide, including relevant transition zones (Figure 2).

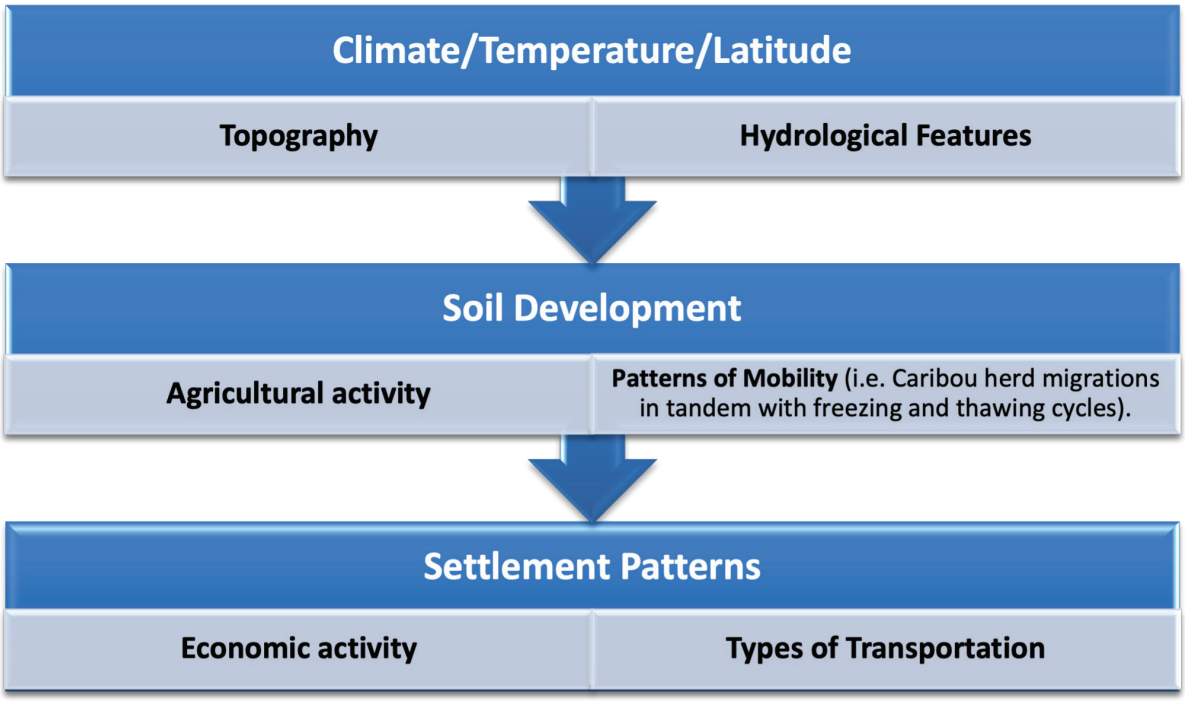
Figure 2. North-South Line and Transition Lines.



Source: McNiven and Puderer 2000, 20.

McNiven and Puderer (2000, 3) claim that the variety of interactive dimensions in the North (i.e., physical features, environmental factors and economic activity) "do not absolutely control economic and human behaviour, but do constrain and/or modify them." The authors emphasize that the North is characterized by its cold climate and that human activities are dictated to a large degree by temperature fluctuations which also influence topography, hydrological features, pack ice, soil development, agriculture and settlement patterns. Some of the ways in which different dimensions characterizing the Canadian North influence each other and characterize Canada's northern diversity are shown in Figure 3.

Figure 3. Dimensions characterizing the Canadian North and their Interactions.



Source: McNiven and Puderer 2000.

Despite the utility of delineating Canada's "many Norths" through nordicity indices, scholars have found that these indices do not adequately reflect the specific local conditions in individual communities (Sheppard and White 2017). Strategies to address infrastructure bottlenecks require locally based solutions (Rodrigue 2021). Nordicity indices raise awareness of current environmental and socioeconomic conditions by providing a timely snapshot of the environment. However, such indices do not provide information about potential future bottlenecks and structural vulnerabilities due to, for example, changing climatic conditions (Koch 2021). Instead, northern and Indigenous knowledge and practices of mobility, which demonstrate a significant degree of multimodal adaptability to the cyclical thawing season, provide a meaningful foundation for understanding the development of regionally appropriate infrastructure in the North. For example, northerners use ice roads across various provinces and territories during the winter while relying on river barge transport and sea lifting in the summer (Prowse et al. 2009). Thus, northern and Indigenous practices of mobility teach us that northern infrastructure should build on a multimodal foundation which is also reflected in the CNC concept.

INDIGENOUS AND NORTHERN KNOWLEDGE SYSTEMS

Canadian policy-makers have already noted that a lack of recognition for Canada's northern diversity can result in slow or stalled infrastructure development, particularly due to insufficient impact assessment processes or consultations with Indigenous and northern inhabitants (CIRNAC 2019). The ANPF provides a foundation for a new understanding of northern policies and indicates a new direction for future northern infrastructure development (CIRNAC 2019). The federal government emphasizes that policies pertaining to infrastructure frameworks and the implementation of individual projects should also consider the impact of new infrastructure on Indigenous Peoples and northern communities. This approach implies an increased awareness for the ways in which infrastructure alters northern spatial practices (see Koch 2021).

Through the ANPF, the federal government has taken steps to recognize the diversity of Canada's North and Arctic, which advocates for new partnerships with Indigenous and northern leaders who "have offered their best innovative, adaptive policy solutions that call for trust, inclusiveness and transparency" (CIRNAC 2019). For example, in addressing the water crisis in Indigenous communities, Castleden et al. (2017, 1) argue that:

> Financial investment in infrastructure is certainly necessary here as well, though it cannot sufficiently address the real problem: the systematic marginalization, or outright disavowal, of the critical role that Indigenous knowledge systems must play in addressing this crisis — a crisis that is, in part, born of the ill-conceived notion of Settler colonial institutions, government agencies, and scholars that Western knowledge systems and solutions are universally useful or applicable.

Indigenous knowledge (IK) is defined as local knowledge that is unique to a given culture or society while traditional ecological knowledge (TEK) offers "a broader area of nature observations and longer timelines of observations" (Sidorova 2019, 3). TEK also "represents the use of local institutions to provide leaders and environmental stewards with rules for social regulation and for the development of appropriate world views and cultural values" (Finn, Herne and Castille 2017, 2.). Despite the recognition of IK and TEK for various policy domains, such as natural resource development and wildlife management, scholars find that there are significant shortcomings to integrating TEK into policy-making (see Eckert et al. 2020; Sidorova 2019).

For example, (Khalafzaia, McGee and Parlee 2019) examined flooding in the James Bay region of northern Ontario, specifically in the Kashechewan First Nation, by focusing on the community's flood-related traditional and local spatial knowledge to investigate the impact of the annual spring flood. The authors find that "traditional knowledge and observations of research participants on changes in their environment helped in the in-depth understanding of the elevated risk of spring flooding" due to climate change and human-induced development (Khalafzaia et al. 2019, 14). The heightened risk of flooding, the authors discovered, has "also exacerbated its impacts on Kashechewan residents especially because of inadequate community infrastructure, the substandard ring-shaped dyke wall and the downriver ice bridge of the winter ice road, which in

turn, has increased the frequency and scale of spring breakup ice jams in the Albany River, without significant change in the annual average flow" (Khalafzaia et al. 2019, 14). This example shows the benefits of integrating IK and TEK into northern infrastructure development as Indigenous communities have observed environmental and climatic changes over the long term while constantly adjusting to their changing surroundings of the land.

THE CNC — RECOGNIZING NORTHERN DIVERSITY FOR A COHERENT NORTHERN INFRASTRUCTURE DEVELOPMENT APPROACH

The federal government lacks a coherent northern infrastructure policy approach, which has created a situation in which northern communities lack basic and essential infrastructure, such as access to clean drinking water (Patrick 2011). A northern pan-Canadian approach, such as the CNC, could address some of the disadvantages stemming from the currently fractured and unco-ordinated approach to infrastructure development. Such an approach must recognize the environmental and socioeconomic diversity of Canada's northern regions, which influences northern practices of mobility. Current ways of understanding northernness are not adequate to offer solutions for regionally appropriate infrastructure development in the North as policies for the North are often conceived in the south. However, a better understanding for and recognition of existing Indigenous and northern practices are necessary to meaningfully address northern needs and interests.

To this end, the Canadian North can no longer be viewed or treated as a region detached from the south and its urban centres. It is important to note that Indigenous communities have been rights-holders and co-designers of safe local and trans-regional infrastructure development, which improves not only local living conditions but also establishes new economic opportunities. Bennett (2018) offers the example of the Inuvik-Tuktoyaktuk highway which was a state-initiated but Indigenous-driven project. Bennett (2018, 146) argues that "Inuvialuit community leaders, whose power emerged directly from the land claims process, successfully drew the state's attention to their proposed highway project." However, as Boyd and Lorefice (2018) note, northern infrastructure development has also often been met with local resistance as affected Indigenous communities considered the consultation procedures insufficient (also see Huseman and Short 2012).

A CNC could offer a solution to some of the challenges resulting from the current piecemeal approach to northern Canadian infrastructure development (Fellows et al. 2020). The CNC concept, as proposed by Fellows et al. (2020) entails a multimodal corridor uniting several types of infrastructure. While focusing on specific geographic segments and different modes of infrastructure, the CNC could offer a flexible response to the infrastructure challenges experienced by policy-makers, transportation engineers and northerners. However, northern infrastructure development and implementation should also be informed by northern Indigenous knowledge and practices of mobility as they have implemented adaptation strategies to respond to changing climatic, environmental and socioeconomic conditions since time immemorial.

For this purpose, the CNC concept specifically builds on the "importance and complexity of the rights and interests of Indigenous Peoples" (Wright 2020, 16). Wright (2020) also referred to the Standing Senate Committee on Banking, Trade and Commerce (2017, 1) which underlined that "Indigenous Peoples' early participation in the development of the proposed northern corridor would be fundamental to its success." Indeed, Fellows et al. (2020, 15) emphasize the potential of the CNC for "inclusive growth and reconciliation" as the corridor concept also supports the Calls to Action from the Truth and Reconciliation Commission for Canada and UNDRIP principles, such as the right to "free, prior, and informed consent" (FPIC).[1] An inclusive and encompassing governance framework that builds on the engagement with northern Indigenous communities, represents a first step to a coherent Canadian northern infrastructure strategy which is, however, cognizant of regional and local conditions across Canada's diverse North.

1 The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), adopted by the UN in 2007, reflects an international instrument to recognize the rights of Indigenous Peoples across the world. Article 19 of the declaration states that "states shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them" (United Nations 2008).

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Katharina Koch completed her Ph.D. degree in Geography in 2018 at the University of Oulu in Finland. Her Ph.D. thesis focused on Finnish-Russian cross-border cooperation funded by the European Union through the analytical lens of critical geopolitics. Following her Ph.D. education, she held a Post-doctoral Fellowship from 2018 until 2019 at the University of Oulu during which she conducted a research visit at the Department of Geography at the University of Calgary in Canada. Currently, she is a Post-doctoral Research Associate in the Northern Corridor Program in the Energy & Environment Department at the School of Public Policy (University of Calgary) for which she is researching a variety of issues related to the concept of the Northern Corridor, including corridor governance and northern and Arctic security and geopolitics.

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