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Foreword

Through a partnership with the National Science Foundation-funded Migration in Harmony Research Coordination Network and the Ecologic Institute, The Arctic Institute is publishing a series of briefs on Arctic migrations and mobilities written by Fellows of the 2021 Arctic Winter College. The Arctic Winter College brought together 60 emerging leaders and experts from across the world for 10 weeks in a free series of web-based seminars, the videos of which can be viewed on YouTube here. The program builds a lasting, policy-oriented network of Arctic professionals to strengthen communication between peoples and nations, scientific disciplines, policy areas, and across the science-policy interface to improve collaborations, research, and decisionmaking in the Arctic. Weekly webinars focused on the theme "Arctic on the Move." Urbanization, globalization, and the impacts of climate change are activating the simultaneous migrations of species, ecosystems, settlements, and cultures across Arctic coastlines in new and unpredictable ways. Each of these intersecting mobilities challenge the quality of life, sustainable development, and environmental health of the circumpolar north. Participants engaged with Arctic researchers, traditional knowledge holders, and practitioners in a variety of fields related to movement to deepen their understanding of a rapidly changing region and its global connections.







Arctic Winter College 2021

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Chapter 1

THE ABSENCE OF LAND TRANSPORTATION INFRASTRUCTURE DISCUSSION IN U.S. NATIONAL SECURITY POLICY

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EXECUTIVE SUMMARY

This briefer addresses the lack of discussion of land transportation infrastructure, namely roads, bridges, and railways, in U.S. national security and research documents that focus on the Arctic region from the last five years. In considering strategy documents from the Congressional Research Service, the Interagency Research Policy Committee, the Department of Defense, and the Department of the Air Force, I analyze how they discuss infrastructure and terrestrial Arctic space. I find the commentary on land transportation infrastructure lacking, in comparison to maritime infrastructure, and recommend that it should be researched and invested into the same extent as other kinds of infrastructures. Land transportation infrastructure is crucial to human, military, and economic security of the region, and could be instrumental in fulfilling the documents objectives, namely cooperation among allies and partners.

INTRODUCTION

National security and governmental research documents see Arctic space as one of increasing mobility, which has both positive and negative effects.¹ The Arctic is understood, as the United States Coast Guard Arctic Strategy termed it, as a "new risk landscape," both from the effects of a changing climate and great power competition.² The threats are multi-dimensional.³ In response, the strategies all desire a secure and stable region, one that is "founded on respect for sovereignty and the international rules-based order," and where "national interests are safeguarded, homeland defended and nations work cooperatively."⁴ Another key objective for operating in the region involves cooperation, both with other federal agencies and with Indigenous groups,

¹ Air Force, "The Air Force Arctic Strategy." Congressional Research Service, 2021. "Changes in the Arctic: Background and Issues for Congress." Department of Defense, 2019. "Report to Congress: Department of Defense Arctic Strategy." Interagency Arctic Research Policy Committee, 2016. "Arctic Research Plan," National Science and Technology Council. ² United States Coast Guard, 2019. "Arctic Strategic Outlook," 4.

³ USCG, "Arctic," 4, 14. The USCG report outlines multiple security issues: "border security, economic security, environmental security, food security, freedom of navigation, geopolitical stability, human safety, national defense, natural resource protection, assertion and protection of US sovereignty rights."

⁴ DOD, "Report," 1. The Air Force frames the region similarly, in that it "wants a secure and stable region where US national interests are safeguarded, homeland is protected, and nations address shared challenges cooperatively."

local governments, private entities, and international allies. Overall, U.S. government entities desire for the region to remain an open and free domain.

LAND TRANSPORTATION INFRASTRUCTURE

One of the key mechanisms for addressing these multidimensional threats is through the maintenance and development of critical infrastructure. Infrastructure is a broad category, encompassing a variety of sectors, from communications and maritime, to airfields and terrestrial spaces. Land transportation infrastructure can be understood as spaces of connection that support the terrestrial movement of vehicles or other sorts of traffic, namely ice roads, railways, bridges, and subways. It supports a wide range of crucial functions for both the military and civil society: from facilitating the movement of material and personnel from different installations, to setting up communication links between entities and connecting communities to emergency services.

Land transportation is also part of larger systems of support and infrastructure, and oftentimes is the critical link between entities, such as communities, sewage treatment plants, and hospitals. Importantly, the creation and maintenance of these kinds of projects are also large-scale and collaborative processes, the coordination of which includes a wide variety of actors, from local leaders to private contractors, at varying scales. While land transportation infrastructure may not be the main source of connection or protection in the Arctic, it is important to consider in relation to the security of the region because it is an active part of more comprehensive human, defense, and economic systems. Thus, it is critical to addressing complicated problems in the region.

RESEARCH POLICY DOCUMENTS

The IARPC report is a product of the Interagency Arctic Research Policy Committee, whose mandate is to develop Arctic research policy and five-year plans. The product of collaboration between federal agencies, departments, and offices, it "calls for strong interagency communication, coordination and collaboration within the framework of the National Science and Technology Council."⁵ Its goal is to outline research that aids in a "fundamental understanding of these changes is needed to inform sound, science-based decision- and policy-making and to develop appropriate solutions for Alaska and the Arctic region as a whole."⁶ More generally, IARPC has a "critical role in advancing scientific knowledge and understanding of the changing Arctic and impacts," and outlines four policy drivers: enhance well-being of Arctic residents; advance stewardship of Arctic environment; strengthen national and regional security; and improve the understanding of the Arctic as a component of planet earth.⁷

⁵ IARPC, "Arctic," 1. It is developed by IARPC, which reports to the NSTC Committee on Environment, Natural Resources and Sustainability, and is published by the Office of Science and Technology Policy. It is also "responsible for the five-year Arctic research plan in consultation" with the US Arctic Research Commission and the Governor of the State of Alaska, the residents of Alaska, the private sector and public interest groups.

⁶ IARPC, "Arctic," 1.

⁷ They also state that their research was guided by [four strategies], also which will help guide its implementation, which include: "support for basic and applied disciplinary research and broader systems-level research based on modelling and synthesis;" the maintenance of measurements that lend themselves to long term observations about the A region, as well as mechanisms to give timely feedback; including indigenous knowledge holders and others who possess local knowledge; and employing international collaboration and "makes the most effective use of costly infrastructure and logistics." IARPC, "Arctic," 2.

In discussing change in the region, they state that sea ice retreat demonstrates "a system of interactions and feedback that amplify Arctic warming," which "urges an understanding of how the system operates as a whole."⁸ To address such a comprehensive ecosystem, the human component has to be included, corresponding with the "growing need for social science in Arctic research." Thus, they underscore a major theme of their document, that complex problems require a systemic approach, meaning that questions should be viewed "holistically in the context of interacting, interrelated or interdependent components" and require "frameworks for generating integrated environmental knowledge."⁹

The report lays out nine goals where an "interagency approach can accelerate progress," ranging from understanding atmospheric conditions to developing a framework for what they term "environmental intelligence-gathering."¹⁰ There are three goals that are important to our analysis of terrestrial systems and infrastructure.¹¹ The human component is immediately centered in the first research goal, which states: "enhance understanding of health determinants and improve the well-being of Arctic residents." Arctic residents are facing a myriad of changes, from an "unprecedented combination of climate and environmental change," and "new opportunities for commercial and industrial development," to "social and economic transformations." The report argues that federal agencies can work collaboratively with Arctic residents, and a "coordinated, evidence-based, government-wide plan can help support and strengthen the capacity of Arctic residents to adapt and respond."¹² While infrastructure is briefly mentioned in the report, in terms of the dangers of permafrost erosion, the construction and maintenance of infrastructure projects provides not only a means through which to improve human security and wellbeing, not least by providing connections to critical services, but these projects also support collaboration between actors in the region.

The second relevant goal is "advance understanding of processes controlling permafrost dynamics and the impacts on ecosystems, infrastructure and climate feedbacks." In discussing the consequences of permafrost degradation, the report states that this can "influence terrestrial and aquatic ecosystems," as well as "impact infrastructure and economics," along with things like human health and altering the global climate. Underscoring the need to understand the Arctic as an interconnected and multi-scalar system, the report calls for mapped and modeled dynamics of the "permafrost related landscape" which is "essential for adequate understanding driving informed Arctic policy and global policy."¹³ In service to this, they include the imperative: "determine how warming and thawing impacts infrastructure and human health," since it can "result in extensive and costly damage to infrastructure and create new risks for northern residents." Most importantly to our analysis is that they also state that "across much of the Arctic where transportation infrastructure is not

⁸ IARPC, "Arctic," 3.

⁹ IARPC, "Arctic," 4.

¹⁰ The Research Goals: enhance understanding of health determinants and improve the well-being of Arctic residents; advance the process and system understanding of changing Arctic atmospheric composition and dynamics and the resulting changes in surface energy budgets; enhance understanding and improve predictions of the changing Arctic sea ice cover; increase understanding of the structure and function of Arctic marine ecosystems and their role in the climate system and advance predictive capabilities. IARPC, "Arctic," 1, 5.

¹¹ For each goal, there are research objectives, or "specific actions intended to benefit from coordinated, multi-agency and possible international research efforts", and associated "performance elements" or "tasks with concrete measurable outcomes that demonstrate progress made towards satisfying the Research Objectives." IARPC, "Arctic," 2.

¹² Characteristic is its discussion of the importance of knowledge about glaciers, ice caps, and the Greenland ice sheet, because "globally, coastal infrastructure, such as municipal gravity-fed sewage systems, subways, ports, military installations, roads, buildings and property can be damaged by storm surge." IARPC, "Arctic," 8. ¹³ IARPC, "Arctic," 33.

duplicated, damages could cut off easy access to communities," and suggest monitoring these conditions.¹⁴ The need to understand the damages to transportation infrastructure underscores the importance of infrastructure itself.

The final relevant goal focuses even further on the material effects of these changes in its mandate to "strengthen coastal community resilience and advanced stewardship of coastal natural and cultural resources by engaging in research on the interconnections of people, natural and built environments."¹⁵ In their list of issues that are important to the Arctic coastal zones and "related to the human coastal communities" they include infrastructure, along with culture, food security, and safety.¹⁶ Infrastructure is mentioned again in relation to the threat of "storm surge and saline inundation impacts," and in a more general invocation that the changing physical coastal processes, especially coastal erosion, have significant threats to "infrastructure, food security, and biodiversity."¹⁷ Thus, infrastructure is discussed in the IARPC report, but due to the opportunities for collaboration that it engenders and the critical need to protect it from harmful processes in the region, it deserves more attention.

The Congressional Research Service's *Changes in the Arctic: Background and Issues for Congress*, which was updated in February 2021, frames what the research service sees as crucial issues for legislators about the region and its changing conditions. The report questions if the US is doing enough to defend military interests in the region and evaluates each of the military branch's strategies.¹⁸ When the report does discuss infrastructure, it is in the context of it lacking. It discusses plans and initiatives of the Department of Defense, calling for improved communications, technology, and training in relation to the Navy and Coast Guard and stating that both branches "currently have limited infrastructure in place in the Arctic to support expanded ship and aircraft operations in the Arctic."¹⁹ In its discussion of the Air Force's role in the region, it highlights issues such as the impact of warmer temperatures on US military bases in Alaska.²⁰ Another big issue are search and rescue operations, and how there are problems with a lack of infrastructure. It recommends "advanced practice cooperation" and "information sharing on infrastructure projects," among other things.²¹

In terms of commercial sea transportation, the report asserts that the basic navigation infrastructure is lacking, and thus needs more marine surveys and ice charts, citing the USACE's survey of a deep draft port feasibility.²² It also discusses the development of mineral, oil and gas exploration stating that any sort of undiscovered resources will not be viable until infrastructure is developed.²³ It continues the conversation by speaking about the relationship of the federal regulatory environment with offshore activity and expressing "concerns" about the "industry's ability to respond to potential oil spills." ²⁴ This leads to a longer conversation about the dangers of pollution, oil spill challenges and tensions in fisheries management, all of which are concerns that can be

¹⁴ IARPC, "Arctic," 37.

¹⁵ IARPC, "Arctic," 39.

¹⁶ IARPC, "Arctic," 43.

¹⁷ IARPC, "Arctic," 43, 46.

¹⁸ CRS, "Report," 40.

¹⁹ CRS, "Report," 46.

²⁰ CRS, "Report," 43-44.

²¹ CRS, "Report," 51.

²² CRS, "Report," 56.

²³ CRS, "Report," 58

²⁴ CRS, "Report," 61.

countered with supportive infrastructural systems. Finally, the report gives a brief overarching view of the effects that climate change will have on indigenous people in the Arctic.

The CRS is a document that communicates to legislators that it "lays out what it sees as imperative issues to this changing region," which helps to facilitate oversight and to identify key areas for resource allocation.²⁵ As an instrument meant to identify strategic goals where agencies can collaborate, the IARPC report presents an instructive dialogue with the CRS report, in that it fills in a lot of the holes that are identified in the latter. Importantly to our analysis, it adds rationale and more specific context for why infrastructure is a crucial focal point for various governmental, societal, and economic objectives in the region.

NATIONAL SECURITY DOCUMENTS

While in the last two decades many branches of the military have released Arctic strategies, this analysis looks specifically at the 2019 Department of Defense Strategy and the 2020 Department of the Air Force strategy, because these branches have the most experience in the region and also discuss infrastructure. There are many overlaps among these documents, since they work in relation to each other and they tend to outline the same understandings of the region and similar goals.²⁶ While the Coast Guard has "served as the lead federal agency for homeland security, safety and environmental stewardship in the Arctic for 150 years," they are the primary maritime presence in the region and thus terrestrial infrastructure is not of primary concern.²⁷

In the 2019 "Arctic Strategy" of the Department of Defense, lays out three approaches that the Department will use to maintain the Arctic as a "secure and stable" region: building Arctic awareness; enhancing Arctic operations; and strengthening the rules-based order in the Arctic."²⁸ Part of their role in the region is to ensure favorable regional balances, and developing a more lethal, resilient, agile, and ready Joint Force. The report outlines three interdependent security interests for the region: the Arctic as a US homeland; the Arctic as a shared region, and the Arctic as a potential corridor for strategic competition, as well as three avenues to protect these interests: awareness, enhancing Arctic operations, and strengthening a rules-based order.

It makes explicit that actors in other regions have invested more in their own infrastructure. The report also assesses the threat from Chinese engagement in the region and the Russian attention to the region as investment in infrastructure projects and energy development, and China continues to invest in dual-use infrastructure in the Arctic. In the section on "Building Arctic Awareness," it addresses operational challenges to communications. Important to our analysis is the statement that the "North American Arctic lacks the

²⁵ CRS, "Report," ii.

²⁶ For example, the Navy's Blue Strategy mentions in the "Modernize Capabilities" section, working with the Office of the Secretary of Defense, Joint Staff and Combatant Command to "meet requirements for defense planning scenarios, campaign plans, deployment models," as well as making imperative advances in "research, development, testing and evaluation." Included in this is a priority is to improve access to critical infrastructure, namely port facilities, airfields and shore infrastructure, as well as "explore opportunities to reduce transit times, preserve mobility and meet logistical demands of naval forces operating in the Arctic." United States Navy, 2021. "A Blue Arctic: A Strategic Blueprint for the Arctic," 18.

²⁷ USCG, "Arctic," 4.

²⁸ DOD, "Report," 1.

infrastructure than the European Arctic has" which "requires the DOD to make time-sensitive, risk-informed investments." These will "enable domain awareness" and increase "effective surveillance."²⁹

In assessing the arctic security environment, it states that "permafrost and storms adversely affect infrastructure - including DOD installations and complicates the development of new and resilient DOD infrastructure."³⁰ Another critical part is the report's discussion on "refining Arctic posture," where it state that it "will assess the needs, costs/risks, and benefits of target investments to modestly enhance existing, regional infrastructure" in Alaska and Europe, in order to "enable operational flexibility to project forces into the region on an expeditionary basis." The DOD's investments "in infrastructure will complement Arctic allied and partner investments" as they "house" U.S. and other like-minded nations' forces."³¹

It also discusses supporting resilient infrastructure, since "critical infrastructure supports the Joint Force's ability flow forces from the homeland and project power globally," and thus it "seeks to enhance the resilience of critical infrastructure in the Arctic" by "coordinating with other Federal departments and agencies and the private sector" to "protect against asymmetric attacks." Finally, it states the importance of building "the resilience of infrastructure in the face of environmental hazards - including research on permafrost to infrastructure."³²

The Department of the Air Force's Arctic Strategy discusses Arctic hardscapes with more specificity than the DOD report. Published in July 2020, the report states that the AF is "more invested in the Arctic than any other department in the US military," and that their main objective is to "deter adversarial behavior and defend the homeland."³³ Along with seeing the Arctic as an eroding buffer for great power competition, the report also frames the region as a "critical launch" point for "global power projection" and accessible natural resources. Thus, it is in their mandate to "build and project power across the region," which can be done through four main lines of effort: vigilance, power projection, cooperation, and preparation.³⁴ Their material presence in the region includes "installations, large bases, training complexes, satellite command and control stations" and a "constellation of more than 50 early warning and missile defense radars."³⁵ The report states that the Arctic supply chain is "expensive and that "most operations must provide their own logistical support." Thus, the Air Force must adopt "Arctic-grade, resilient infrastructure and expeditionary, modular components."³⁶

In terms of explaining the region, the report states that the Arctic's "vast distances" provide challenges to surface operations and thus render air and space capabilities essential "to gain rapid access and provide "all-domain awareness, early warning, satellite command and control," and effective deterrence.³⁷ The Arctic is "particularly reliant on air, space and cyber power" to "provide rapid access, reach and domain awareness." It

²⁹ DOD, "Report," 9-10. This bucket also includes improving communications and intelligence, surveillance and reconnaissance, with such needs as deployable communications and data networks capable of operating in higher latitudes, as well as aerial and terrestrial communication equipment.

³⁰ DOD, "Report," 2-3.

³¹ DOD, "Report," 12.

³² DOD, "Report," 12.

³³ DOD, "Report," 1,4. They also state that the Air Force provides close to 80% of DOD resourcing in the Arctic.

³⁴ Air Force, "Air Force," 2.

³⁵ Air Force, "Air Force," 4.

³⁶ Air Force, "Air Force," 9.

³⁷ Air Force, "Air Force," 4.

also states that the North American Arctic has less infrastructure and Alaska "epitomizes this geographical disparity in infrastructure."³⁸

In discussing threats in the region, it includes "thawing permafrost," which affects infrastructure and includes "hangars and runways." Also, the "reductions in single and multi-year polar ice" are increasing the "rate of coastal erosion" and thus putting the infrastructure of the Air and Space Force already at risk.³⁹ As part of its discussion of investments, the report suggests investing in infrastructure, with a focus on "thermal efficiency and durability" - and which will be combined with fifth generation aircraft and lethal capabilities.⁴⁰

Most important to this analysis is their section on infrastructure development, which states that base infrastructure is a "central component to power projection." In order to be maintained, "materials need to meet standards: high thermal efficiency, long term durability; tolerance to repeated freeze and thaw cycles; and resistance to permafrost degradation." Thus, to address this the department needs to "advocate for future investment in installations that match future operation needs."⁴¹

In discussing how to approach these issues, and once again underscoring the need for cooperation among allies, the Air Force report states that they "will work with interagency partners to forecast changes to the Arctic environment that impact infrastructure and operations," which is exactly what the IARPC is establishing.⁴² In the aggregate, all of these policy documents show a communication across agencies, a larger conceptual understanding of the Arctic as a space of mobility, information and risk. They are also tools of communication to international actors and means through which to direct money and attention but demonstrating priorities.

All of these strategies frame, to various extents, the importance of infrastructure to operations in the Arctic, especially in terms of goals, such as power projection and operational flexibility. Noticeably, these strategies, if they mention land infrastructure are all, lack specificity in the kinds of investment that is needed. In contrast, they are explicit in their discussion of maritime infrastructure. For example, the CRS report focuses particularly in maritime infrastructure in the context of Search and Rescue operations, oil and gas operations, and the potential for deep draft ports. Absent is any discussion of land or ground transportation, which would be crucial for supporting operations of various groups and communities operating and inhabiting the region. The Air Force has goals of projecting power across the region, and thus air and space power capabilities are crucial for access and domain awareness. However, unlike how the report discusses the specifics of radar and warning systems, the infrastructure that is crucial to fulfilling their objectives is present only in terms of saying more investment is needed.

The DOD report discusses infrastructure in terms of how it is being negatively affected by phenomena such as coastal erosion, but it also does not go into the specificity that it does for building up other capabilities. The IARPC report, which does invoke civilian and military infrastructure briefly, is effective in its specificity, in that it not only lists well-articulated lists of initiatives but also includes specific groups, such as the Alaska Rural Water and Sanitation Work Group, that will be instrumental in addressing the issues. However, there are no

³⁸ Air Force, "Air Force," 4.

³⁹ Air Force, "Air Force," 6, 10. Infrastructure in places like Thule have "deteriorated because of extreme environmental factors."

⁴⁰ Air Force, "Air Force," 3.

⁴¹ Air Force, "Air Force," 10.

⁴² Air Force, "Air Force," 9.

initiatives that directly address land infrastructure, even though they would be crucial in fulfilling the other initiatives, such as improving health care delivery services. Overall, the strategies have not focused on the infrastructure, and particularly maritime infrastructure, to the same extent that they have focused on other elements of their activities in the Arctic, and this is to the detriment of the strategies.

IMPLICATIONS & OPPORTUNITIES

As the strategy documents have laid out, there are major implications for not addressing land transportation infrastructure. Due to fires, storm surges, permafrost thaw, and coastal erosion, current infrastructure is denigrating and necessitating the need for not just maintenance, but also new infrastructure so as to relieve some burdens on the existing ones. Also, since these systems are connected, research on land transportation infrastructure bolster investments in other key domains. Supporting the development of land infrastructure will allow for the bolstering of other systems that facilitate the administering of emergency and public services, the movement of materiel and supplies, and the maintenance of a robust force presence in the region. Land transportation infrastructure can also be a vital avenue for meeting the objectives that are laid out in national security documents, especially in regard to collaboration and cooperation with domestic, specifically local, partners, and supporting the agendas of search and rescue approaches in the region. It is important for this to be discussed in these policy documents because they are representations of and mediators for the communication between agencies on these issues, and, on a more material level, affect how money is allocated to the region and to different initiatives. Focusing on land transportation infrastructure also opens up opportunities for developing some of the initiatives that the documents are outlining, especially with regards to cooperation and collaboration with various stakeholders in the region, namely local and Indigenous groups.

RECOMMENDATIONS

Land transportation infrastructure is a crucial element in facilitating security and sustainable development in the Arctic, especially in relation to the increasing risks, both from a changing climate and increased great power competition. My main recommendation is that it needs to be addressed in these documents specifically, both more explicitly in the research documents, as well as being included in the military documents. In terms of security, the development of such infrastructure will bolster defense, human, and economic security.

The first option is incorporating land transportation infrastructure in research policy documents. The upcoming IARPC Research plan is an excellent opportunity to explore this area further. In terms of further research, the current state of completed projects needs to be assessed with regards to their maintenance needs, and new projects need to be considered and developed within a robust participatory process that includes stakeholders in the local communities. This could be studied under either the guise of the first research goal on public health and well-being of Arctic residents, or under the eighth research goal that pertains to bolstering coastal communities by investigating the links between humans, the natural environment, and the built landscape. In terms of the Congressional Research Service report, there is also no infrastructure-related report on Specific Arctic related issues, and this would be a good way to start incorporating terrestrial infrastructure into the document. While starting their inclusion with research is the best way, the military departments should also include land transportation infrastructure in their policy documents, even if it is bundled with other infrastructures that they consider more critical. LTI is critical to establishing both national security and sustainable development in the Arctic region and therefore it needs to be included in research policy documents and national security policy documents.

Chapter 2

HOUSELESSNESS IN ALASKA: MYTH VS.

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EXECUTIVE SUMMARY

This brief draws on an ongoing remote ethnographic studyⁱ examining how varying modes of housing insecurity are experienced by Alaskans. This includes:

- an introduction to the term "houselessness," which describes shifting modes of housing insecurity caused by socio-economic changes and unanticipated life events, but also housing shortages, difficulties acquiring land and permission for building new housing, and (especially for some Indigenous groups) the foreign nature of home financing.
- reflections on the precarious living situations that Alaskans from rural communities' experience across their lifetimes.
- the need for further qualitative research that interrogates how assumptions about houselessness are experienced by Alaskans in different contexts, not least because the term houselessness is a proactive attempt to delimit narrowly defined and demeaning terms such as homelessness.

Introduction

This brief describes how research on housing security issues needs to account for the transient situations in which Alaskans in rural communities may experience houselessness throughout their lifetimes. Developing insights into the shifting ways in which houselessness is experienced provides a critical framework for revisiting prevailing policies and developing new practices concerning housing security issues in Alaska and beyond.

Reflecting on Houselessness

In a recent article, Christensen et al. introduced the phrase "northern geography of homelessness" to accentuate the intersecting concerns that shape "the dynamics of rural-to-urban migration and urbanization in the Arctic."ⁱⁱ The authors argue that there are likely "high rates of hidden homelessness (i.e., temporarily staying with friends,

relatives, or others because there is nowhere else to live and no immediate prospect of permanent housing), particularly in rural, remote, or settlement communities."iii

Building on this work, this brief draws on an ongoing remote ethnographic study focusing on how the notion of "houselessness" can provide critical insights into how migration between rural and urban contexts in northern Alaska produce shifting modes of houselessness.^{iv} These shifts in housing security provide insights into both context-specific factors in Alaska and implications for understanding the situated nature of housing insecurity in Arctic communities more generally. By generating thick descriptions of these issues, deeper insights about the various assumptions underlying public policies concerning housing security can emerge. To explicate this point further, this brief describes three modes of houselessness that were identified through interviews with experts who work on housing issues in remote and urban contexts in rural, hub, and urban contexts in Alaska. In the Alaskan context, most regions include numerous small, remote, and predominantly Indigenous communities that are commonly called villages or "outlying villages" and a larger regional "hub" community, which are also usually remote and predominantly Indigenous but with larger airstrips and more services. Utqiavik (formerly Barrow), for example, is the hub community for the North Slope region.^v

The first mode of houselessness concerns overcrowding in rural villages and its impacts on health and safety, a topic that was widely discussed in the research informing this brief.^{vi} Chantel.^{vii} a housing authority expert who has worked with rural Alaskan communities for over two decades, explained in an interview that many rural communities face severe housing shortages. As a result, there are high rates of overcrowding throughout northern Alaska's rural communities. In these communities, people may end up living with extended family members and friends in a 1200-1300 square foot home. High occupancy rates in these homes can force occupants to sleep in shifts. Moreover, during winter when homes are sealed as much as possible to keep out the cold weather, the air quality can become very unhealthy.^{viii} Furthermore, many of these homes were not designed for arctic and sub-arctic environments, which can lead to moisture in wall cavities (usually through wind-drive precipitation or inadequate indoor venting, which produces mold and structural damage.^{ix}

A second mode of houselessness may be experienced when a resident moves from a rural community to a hub city, like Nome or Bethel, or an urban area, like Fairbanks or Anchorage. In both hub and urban contexts, the cost of living can create uncertain living situations. As Martin, who worked for several regional housing authorities, explained:

There's often a rat race where like people who [are working] entry level [jobs], work really, really hard and they just get exhausted, and they don't have a social safety net and they either give up and go back to their overcrowded home or they try to move on to Anchorage.

Expanding on the precarity of this issue, Martin shared that for many people he has worked with, becoming houseless is a constant concern.

I think there's some pretty unexpectable situations that people run into. Kid gets sick. Someone doesn't have a babysitter; something happens and they're \$50 away from making rent.

These levels of uncertainty can elevate into anxiety that can lead to illness, and which is only increased when community ties are lacking.^x

While the previous examples focused on housing insecurity, a third important but less studied aspect of this phenomenon concerns how popular assumptions about houselessness become "urban legends." Consider the

following reflections shared by Erica, a community organizer, who works with houseless and vulnerable communities in Bethel, Alaska.

There's an urban legend that folks who have no houses in Bethel somehow wish to return to the village that they're from. And if they had a way to get there, that's where they would prefer to be. So, we did some data collection about that. We asked people like, where do you want to be? And these folks... consider themselves members of our community here and have no desire or intention to return to villages.... So, it's interesting how, like these narratives get built up and the data really dispels kind of all of those things.

The idea that houselessness can be both pervasive in hub communities like Bethel yet also obscure and deeply misunderstood in those same communities and even among people who work with housing and homelessness is an important factor. Erica continued:

I don't know other hub communities; I only know this one. But I can tell you that if you walk through the grocery store and ask 20 people, "are there people who are unhoused here?" or "are there people living on the streets?" you know, probably 80% of them are going to tell you no. But when you interview folks [and ask them] where did you sleep last night, [it's] abandoned vehicles, shacks, in a tent somewhere along the river... [or] if you talk with police who actually know where people are, it's a very different story because folks are not as visible in that way as they are in urban centers.

This final example illustrates that houselessness cannot be easily collapsed into a singular definition. Rather it is a social phenomenon that is shaped and shapes socio-economic contexts in which people find themselves living. Furthermore, the idea that houselessness can become wrapped up in "urban legends" or myths that obscure shifting ways that houselessness is experienced in rural and remote areas of Alaska mirrors an observation made by Aaron, an interviewee from Quinhagak. He explained that it is often assumed that houselessness does not exist in rural villages, yet he has personally witnessed several fellow community members become houseless.

The term "houseless" is used in this brief because "homeless" does not capture the diversity of factors that influence housing insecurity in Alaska. In fact, the term "homeless" is strongly resisted by both housing advocates and people experiencing houselessness. For instance, advocacy organizations like *Do Good* argue for using the word "houseless" to replace homeless because it more accurately describes the spectrum of factors that shape people's experiences with housing insecurity. The following statement is included on their website page:

Houselessness is simply lacking a place to live. We use the term "houseless" because that is the term most of the population we serve chooses to use. We choose to listen to their preference and make the conscious effort to empower our participants in any way we can, which sometimes means adjusting our word choice.^{xi}

Similarly, in our research we spoke with Renee, a housing advocate and designer who recently worked on a collaborative project involving the unhoused, professional designers, and housing experts. Reflecting on this experience, she pointed to narrow meanings that are popularly associated with the concept of "homeless." The term, she explained, is an issue that the people she was working with who are experiencing houselessness see as a critical barrier for their wellbeing because it carries so many stereotypes and ignores the complexity of issues facing unhoused communities. As she shared:

The group of people experiencing houselessness said that they wanted to be de-stigmatized and decriminalized - that their experiences weren't based on...this immediate idea that they're bad people or people who are broken, or... whatever...

just like everyone else. They highly value human connection, acceptance, and positive recognition that there are lots of subpopulations. So, there needs to be a variety of solutions and not everyone defines home in the same way. And not everyone wants to be housed. And houselessness is a symptom of a systematic issue, not an issue associated with a person with regard to space needs....

The reality that housing insecurity in rural Alaska is part of an entangled network of factors stretching from housing shortages to overcrowding, and from a lack of access to land and funding resources for building homes, are all subjects that participants in our research project continually remind us necessitate alternative models and ways of approaching housing.^{xii} These issues are tightly interwoven and must be addressed in collaboration with those who have real world experiences with houselessness. As one community advocate conveyed: "I think it's vitally important to include people who are experiencing [these issues] into the conversation."

Accordingly, builders, designers, and housing specialists working in rural Alaska have impressed on us the importance of rejecting approaches that frame the building of homes as a ubiquitous solution. Home building as a solution in Alaska is instead variable by necessity, by culture, and is deeply tied to and shaped by place-specific factors.^{xiii} Structural factors often overlooked include colonial legacies, subsistence practices, weather patterns, changing environmental factors, and access to heavy equipment. Identity and community politics also need to be accounted for when building homes, along with the professional cultures of designers, engineers, and builders who employ expert language practices, specialized methods and tools, and conceptual orientations towards home building that are specific to their social worlds. The cultural and structural nature of these concerns, however, should not obscure the fact that homes are more than just shelters. They provide the means for "enriching the weaves that bind people and their environments."^{xiv}

Consequently, as continuing research is conducted on these issues, these examples point to the notion of houselessness as a useful framework for developing more nuanced understandings of housing insecurity in northern Alaska communities.

Policy implications: This preliminary research highlights the need for developing context-specific policies and practices. Policy makers should consider developing resources for addressing houselessness that empower local communities to make their own culturally appropriate and informed housing decisions. Secondly, developing flexible funding streams to address houselessness is critical for increasing the capacity of communities to proactively respond to changing scenarios in times of crisis, like the current pandemic.^{xv} Finally, policy makers should support research collaborations that bring together social scientists, community stakeholders, and Alaskans with first-hand experiences of houselessness to co-produce further qualitative insights that can inform policy. This includes calls for research that probe assumptions about housing insecurity, including cultural conceptions of "home,"^{xvi} urban legends that may perpetuate misconceptions, and the anticipatory needs of rural communities as they adapt to climate change and related environmental concerns.^{xviii} In taking this approach, public policy makers need to think about housing security issues in Alaska as being made up of what the social anthropologist Arturo Escobar describes as multiple and generative social worlds.^{xviii} Put simply, home building approaches and policies need to prioritize adaptive practices that identify and respond to context-specific needs. Such practices entail collaborations with local communities to develop tailored responses in real time and require an understanding of houselessness that is deep enough to dispel myths.

Chapter 3

DEEPENING INEQUALITY? A CRITICAL ASSESSMENT OF THE USACE PORT OF NOME MODIFICATION FEASIBILITY STUDY

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INTRODUCTION

In February 2020, the US Army Corp of Engineers (USACE) released its final Modification Feasibility Study for the Port of Nome (Alaska), which is slated to become the nation's first deep draft Arctic seaport. After analyzing thirteen contending port cities, the USACE determined that Nome was the most cost-effective location for the deep draft port due to its existing infrastructure, intermodal connections, well-developed uplands, water depth, and navigational accessibility. Since the study was completed, the City of Nome has successfully lobbied the State of Alaska to assist in securing the estimated \$635,525,000 price tag⁴³. The USACE 2021 work plan, released in January, has already requested appropriations for \$2.7 million in order to "initiate and complete preconstruction, engineering, and design phase". With Arctic geopolitical competition between the US and Russia simmering in the background and Alaska's desperate financial condition demanding new sources of growth, most indicators point to the thrifty and perfunctory adoption of the port project by all state stakeholders.

The USACE's assessment process, however, evinces critical flaws for two central stakeholders: the regional tribal entity, the Nome Eskimo Community, and the Bering Strait Native tribal consortium, Kawerak Inc. In a direct and unequivocal letter to the USACE in February 2020^{xix}, Kawerak drew attention to a range of problems with the feasibility study, including procedural inequities, unfounded claims of benefits, overlooked socioeconomic impacts and, most glaringly, the failure to comply with provisions in the Water Resources Reform and Development Act to accommodate subsistence resource users. In light of the blatant disregard for Alaska Native voices in state development and evaluation practices, whose inclusion and consultation are legally required by Executive Order 13175, the Alaska National Interest Lands Conservation Act (Section 810), and formal policies of the Department of Interior and USACE, this policy brief recapitulates and augments Kawerak's call for an annulment of the current feasibility study's findings and a renewal of the evaluation process with the full and equal participation of Tribal governments and representatives.

⁴³ It is worth noting that in journalistic sources, the estimated cost for the expansion appears to fluctuate substantially, even after the publication of the Study and its preferred alternative. These range from a low of \$491 million in June 2020 (<u>http://www.nomenugget.net/news/us-army-corps-signs-port-nome-expansion</u>) to \$505 million in January 2021 (<u>http://www.nomenugget.net/news/nome-port-commission-discusses-port-expansion-project</u>) to \$618 million (<u>http://www.adn.com/business-economy/2020/06/11/army-corps-approves-long-sought-618-million-plan-to-expand-port-of-nome/</u>) and most recently, \$640 million (<u>http://www.nomenugget.net/news/nome-showcases-port-expansion-harbormasters-conference</u>).

KEY POINTS

The USACE Port Modification Feasibility Study is flawed and subverts federal norms of Tribal consultation in development projects

- Neglecting critical provisions of the "Remote and Subsistence Harbors" clause of the Water Resources Reform and Development Act strains USACE credibility and places the Expansion project, justified under the Act, in precarious legal territory
- Approval of the project should be withheld until the full and adequate completion of an EIS and subsistence use analysis under the Alaska National Interests Lands Conservation Act, Section 810
- A "No Action Alternative" should be given due consideration in light of the enormous tax burden
- The "Finding of No Significant Impact" must be withdrawn and steps taken to responsibly mitigate environmental and community impacts

SUPPORTING EVIDENCE

Historically, Alaska Native communities of the Bering Strait Region have not been adequately included in land or ocean planning processes; their values, ways of knowing, and concerns are rarely incorporated into assessment, planning, or feasibility studies^{xx}. This situation persists despite the United States becoming a signatory to the United Nations Declaration on Indigenous Peoples in 2010, wherein Article 32 affirms the right of Indigenous Peoples to "give free and informed consent prior to the development or exploitation of their water and other resources"^{xxi}. The Port of Nome Feasibility Study bears this out, as the release of the draft at the end of 2019 was accompanied by a short, one-month comment period, which Kawerak attempted to extend, but was denied.

Since the passage of the Alaska Native Claims Settlement Act (ANCSA) in 1971, much of the Nome region's land base has been under the ownership of the Bering Strait Native Corporation, including the lands being considered for the port. Originally, the provision of fee simple lands to for-profit Native Corporations under ANCSA effectively eliminated the possibility to claim land in the form of reservations "in trust", depriving Alaska Native Tribes of rights to consultation available to Tribes in the lower 48. Without many formal supports from the Bureau of Indian Affairs, the ultimatum presented to Alaska Native corporations was to exploit the limited lands conveyed to them or perish in the market^{xxii}. Though the provisions of the recent CARES coronavirus relief act have instigated a legal dilemma about the status of ANCSA Corporations, their exclusive and corporate (rather than democratic or governmental) control over ANCSA-conveyed lands has long been a source of tension with federally recognized Alaska Native tribal governments. While the commitment of the USACE, Bureau of Indian Affairs, and other federal agencies to Government-to-Government consultation with Tribes and Alaska Native Corporations was reaffirmed in 2003, this policy brief indicates that the process remains superficial and fundamentally inadequate. Within the Nome Census Area, seventy five percent of the population identifies as Alaska Native, who also comprise nearly all non-urban residents. These communities face stark disparities in quality of life, with 22% of the population living in federally defined poverty and evincing an unemployment rate consistently 3-4% higher than the rest of Alaska for the last 10 years^{xxiii}. With few other solutions offered by the state to address these persistent inequalities^{xxiv}, the port expansion project offers a deeply ambiguous path to changing the region's economic fortunes.

INADEQUACIES OF THE USACE STUDY

In a 2019 presentation given to request financial support for the Port Expansion from the State of Alaska's Legislative Transportation Committee, then-Mayor Richard Beneville asserted that the project would "assist in generating long-term economic benefits to the region, state, and nation"^{xxv}. He noted that communities and the city could expect to see "increased economic opportunity", "reduced cost of living", and "increased environmental/life-safety capacity"^{xxvi}. These guarantees of local benefits were buttressed by promises of improved national security conditions, obtained from the Department of Defense (DoD) and US Coast Guard (USCG). In response, the Alaskan Congress confirmed that they would assist the City of Nome in securing necessary funding from other private and public agencies. The formal USACE study, however, offers a caveat in its opening pages that "while it is difficult to quantify a direct link between a Nome navigation project and improvements to the viability of a community, Port of Nome improvements can strengthen the *resiliency* of the region"^{xxvii}. This admission is a far cry from the rosy, if vague language of Beneville's presentation, and reveals a host of assumptions about how the conceits of development are perceived and deployed strategically. Considering the high price tag of the port, such weak economic rationale deserves scrutiny from both policymakers and taxpayers.

The port expansion can best be understood as a strategy to capitalize on anticipated increases in vessel traffic in the Arctic, which is becoming accessible to greater shipping traffic due to unprecedented human-caused climate change. The economic viability of the project is dependent on this becoming a reality, as only increased traffic and its associated revenue for the City can provide a return on mass public investment. Nome was chosen as the US Arctic deepwater port in 2015 for a variety of reasons, chief among them being its "mission proximity" to potential oil and gas leasing and undersea mining sites in the Chukchi and Beaufort Seas^{xxviii}. The City's 2020 Comprehensive Plan identifies attracting oil and gas interests to use Nome as a staging area as a "strong desire", among which was also "capitalize on offshore activities for economic gain"^{xxix}. Furthermore, the increased capacity of the port, not to mention its fuel storage and delivery services are projected in the longterm to reduce the costs of Arctic shipping, in turn making Nome port services increasingly competitive and opening the region to greater energy-intensive activity. In light of the Biden administration's firm commitment to transitioning away from fossil fuel development, the existence of uneconomic offshore hydrocarbon deposits should not play a role in justifying the port expansion.

The economic argument for the port falls short again in the analyses used to select among alternative plans: a National Economic Development (NED) analysis, which evaluates alternatives based on their ability to increase net *national* output of goods and services^{xxx}, and a Cost Effectiveness/Incremental Cost Analysis (CE/ICA), which measures "other social effects". The NED analysis results failed to identify a preferable alternative as "no alternative plan reasonably maximized benefits or resulted in a positive benefit-cost ratio (BCR), indicating that a plan could not be selected on the merits of the NED analysis"^{xxxi}. Even the addition of national security measures did not elevate any alternative into viability. In their letter of concern, Kawerak Inc. requested that NED analysis be reinstated because ignoring it risked offloading costs or losses onto the community^{xxxii}. Disregarding this, USACE relied on the latter analysis, which is based on the measurement of "Community Viability Units" (CVUs). The selection of variables is different for each of USACE's projects^{xxxiii}, but for the Port of Nome, they included four: "Other Port Economic Effects" (OPE), "Port of Refuge Effects" (PRE), "Cargo Delivery Reliability" (CDR), and "Overwater Fuel Transfer" (OFT). These criteria, whose value is calculated as an offset of total project investment, only tangentially relate to local well-being and ultimately serve to justify the selection of Alternative 8b, which fulfills the base requirements of the port in terms of draft

depth and increased capacity with maximum cost efficiency (the aforementioned price tag, 900 times more money than the port currently generates in a year). What this ultimately meant is that another, more expensive alternative, 8a, which offered stronger CVU-related benefits, was not chosen, while an alternative of "No Action" was entirely absent.

The Study also contains an environmental assessment, which documents mainly minor or short-term impacts to hydro- and geologic systems as well as wildlife. But it does not consider the benefits of existing "natural infrastructure"xxxiv to the Nome community, nor does it recognize how climate change might undermine potential economic benefits^{xxxy}. Rather, it touts sea ice loss as a boon and emphasizes the failures of natural infrastructure due to climate change, such as the erosion of Nome's beaches, even posing the practice of beach nourishment using dredged materials as a solution, despite the lack of evidence for its effectiveness^{xxxvi}. Both climate catastrophe and resilience narratives are selectively deployed in this document to support intense modification of the environment. Such "environmental standardization" practices are necessary for integrating the port into global shipping networks, but they also create other problems that the study may distort for its own purposes. Dredging, the project's core alteration of the environment, is depicted as minimally impactful and only in the short term; disturbance of bioavailable arsenic sediment is justified with reference to federal and state water quality criteria. When addressing impacts to wildlife, the study downplays aquatic toxification, but does recognize that construction will displace avian, marine mammal, and fish species, as well as destroy crab habitat, with estimated 6-7-year recovery times. Considering the duration of construction, upwards of four years, it is no wonder that these risks prompted the Nome Eskimo Community and Kawerak Inc., to raise the issue of long-term migration shifts or population loss for culturally important sea mammal species xxxvii. In glaring contrast, the study suggests that the extended jetties will provide new haul-out zones for seals, nesting sites for birds, and desirable fish habitat, despite the high levels of noisexxxviii and activity generated. It must be understood that harm to wildlife and environmental health is commensurate with harm to Indigenous peoples' lifeways, food security, economies, and spirituality.

The US law under which NED-exempt port development is taking place explicitly obligates the state to address Indigenous community livelihoods: the Water Resources Reform and Development Act (WRRDA) of 2007 requires projects proposed under the authority of "Remote and Subsistence Harbors" to serve the needs of subsistence users by building a dedicated subsistence boat harbor. This provision is not incorporated into the study. As Kawerak's letter puts it, shirking this legal obligation "seriously jeopardizes exemption from national criteria under the authority of the Remote and Subsistence Harbors and creates negative impacts for subsistence users". The Introduction of the USACE study also makes the claim that port development will "support access to natural resources for subsistence purposes", but subsequently qualifies it as, "not meant to indicate that physical travel to subsistence use locations by small vessel would be improved; however, port modifications are not expected to significantly impact small subsistence vessels. Port operations have both potential positive and negative impacts on travel by small subsistence vessels depending on vessel congestion"xxxix. But the section devoted to subsistence (pp. 231-236) goes on to refute even this, noting that greater restrictions around hunting in the vicinity of a busier port and the requirement of requesting Harbormaster approval for harvest would limit hunting and fishing opportunities. During negotiations, Indigenous representatives also pointed out that the longer causeway and breakwater would ultimately cost small subsistence vessels more time and fuel expenses to leave port, which would have an outsize impact on their narrow economic margins.

In conclusion, development in the region stemming from the project is likely to reduce overall access of community members to subsistence resources. Because of Alaska's equal opportunity hunting and fishing laws,

a greater number of visitors or new residents to the region could stress wild animal populations like caribou and fish, and larger, commercial fishing vessels could increase and outcompete locals. Despite demands for the inclusion of a subsistence vessel harbor by Kawerak, the only response offered by the USACE is that greater efficiency of fuel and cargo delivery *could* reduce the costs of subsistence practice.

POLICY RECOMMENDATION

The oversights and obfuscations of the USACE Port of Nome Modification Feasibility Study necessitate a firm and principled halt to the project's moving forward, pending serious engagement with the concerns raised by Kawerak and the Nome Eskimo Community. As anthropogenic climate change makes the Arctic Ocean more accessible to human activity, it is incumbent on municipal, national, and corporate decision-makers to adopt a precautionary and restrained attitude towards the deeply uncertain future of the region. Understanding Earth's resources and carrying capacity to be finite, the construction of new mega-infrastructures to facilitate natural resource extraction and the delivery and consumption of manufactured goods can serve to deepen the global ecological crisis, rendering all human and biotic communities vulnerable. The fact that the Nome port development study is dismissive not only of taxpayer burdens and environmental impacts but of impacts on the invaluable cultural heritage and identity of Bering Strait Indigenous peoples demonstrates a fundamental flaw in the USACE evaluation paradigm, which can be remedied by an agency commitment to principles of equity and sustainability. It is the unequivocal position of this policy brief that, if justified under the "Remote and Subsistence Harbors" clause of the Water Resources Reform and Development Act, the Study in question must be renewed with a commitment to incorporating a subsistence vessel harbor into the design and engaging Indigenous stakeholders in a respectful spirit. As per Kawerak, Inc.'s position, the renewed Study must furthermore include a full and adequate subsistence use analysis as stipulated under Section 810 of the Alaska National Interests Lands Conservation Act and the "Finding of No Significant Impact" must be annulled. As the Pacific gateway to the Arctic Ocean and one of the world's most productive marine ecosystems, the Bering Strait and its people deserve the benefit of our accumulated knowledge and wisdom in the common effort to preserve and understand our rapidly changing planet.

Chapter 4

LOCAL INFRASTRUCTURES AND GLOBAL CRISES IN THE REMOTE ARCTIC: IMPLICATIONS FOR THE EU ARCTIC POLICY

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SUMMARY

- The COVID-19 pandemic and the climate crises are both revealing resilience and inequalities in the Arctic region
- These inequalities are manifold, and many relate to infrastructure either lack of or unequal, not cultural-appropriate access to them in a remote context
- Infrastructure can provide an overarching framework for policymaking in the Arctic, also for the EU
- The EU should consider the relevance of the local level more strategically and link this relevance to infrastructure issues

INTRODUCTION

Characterized by rurality, sparse populations, and scarce infrastructure, remote regions encounter a two-sided situation during the global COVID-19 pandemic. On the one hand, remoteness proved to be an advantage due to less exchange with other regions and the possibility to isolate the virus more effectively. On the other hand, too many infections challenged the limited local infrastructures such as local health services, and closed borders as well as interrupted supply chains posed problems for communities that are more isolated.^{xl} Major healthcare centers are often far away, thus the transport is long and expensive. The crisis further underlines the significance of the urban governance level due to its immediate and essential crisis management. Through local governance, cities and urban centers are fulfilling regional and international responsibilities.^{xli}

However, the Covid-19 pandemic is not the only crisis confronting the Arctic region. The global climate crisis and its drastic effects on all areas of Arctic life are shaping the region. The Arctic is warming at least at twice the rate of the global average due to the phenomenon known as Arctic amplification.^{xlii} Environmental as well as climate impacts of human activities are already visible in the region, which help to understand potential global impacts of climate change (*Anthropocene*). Not only are the coronavirus crisis and the climate crisis interlinked, they also respectively reveal the resilience and strengths of the region but also existing inequalities, which have been challenging before but get more urgent and pressing now under the new circumstances. In the Arctic, these inequalities are manifold, and many relate to infrastructure – either lack of or unequal, not cultural-appropriate access to them.

The Arctic is shaped by states and non-state actors – with the European Union (EU) seeking for a rising Arctic profile and claiming a leadership role. By specifically looking at the EU, the developments in the region are not only relevant for the European Arctic but play a critical role for the entire EU and beyond, framing the (European) Arctic as a global region. The EU's policy towards the Arctic has an inherent internal and external character since some areas concern European countries themselves while others account for neighboring (non-)Arctic actors or for spill-over effects of EU's activities on other countries and actors in the Arctic context.

For the EU, it is crucial to reflect new challenges, priorities, and experiences against the background of both crises – particularly in terms of infrastructure and the relevance of the local and urban level. The EU published its new Arctic policy in October 2021^{xliii,xliv} under the framework of the European Green Deal, the new growth strategy of the union aiming to be the first climate-neutral continent. I argue that in its new Arctic policy, the EU should have considered the relevance of the local level, enhanced the role of cities and urban centers, and linked this relevance to infrastructure issues. Due to rising economic activity and migration, the trend of urbanization has quite recently emerged as a phenomenon in the European Arctic with growing urban populations^{xlv} and new urban identities.^{xlvi} Similar to other world regions, cities fulfil a key function for tackling climate change and implementing sustainable development practices.^{xlvii} Thus, urban developments are taking on an increasingly important role. These developments include many infrastructure-related measures. Whether these developments in the Arctic are sustainable or not also impacts lower latitudes due to the region's significance for the world's climate. Since both crises set local (infra)structures under pressure, the EU needs to broaden its scope and address the local level more strategically by supporting transnational cooperation formats, which bring together actors from different spheres and governance levels.

THE POTENTIAL OF INFRASTRUCTURE FOR THE EU'S ARCTIC POLICY

However, why should the EU focus more on local infrastructure? To deal with this question we must first understand the needs of Arctic infrastructure. Infrastructure can be understood as the basic systems and services a country or organization relies on to function. Its physical and material dimension, for instance roads, electricity lines and water pipes, contain social, material, aesthetic, and political formations shaping everyday life experiences and prospects of the future.^{xlviii} While considering infrastructure, their spatial and temporal character needs to be taken into account as well, framing them as spatiotemporal projects that connect different places at different times.^{xlix} At the same time, infrastructure always implies questions of distribution and power by understanding processes of infrastructure in linguistic terms, needs to be taken into account. Infrastructure expresses a certain localness but is embedded in broader frameworks shaped by national and international dynamics. Due to their local, regional, and global functions and character, questions of infrastructure can serve as bridges between different governance levels and policy fields.

However, infrastructure relates to far more than streets, energy, and housing, but also considers issues of access to health services, digitalization, research, and inclusion of knowledges – all relevant questions in the Arctic context. The one health concept, which many experts are currently referred to in the context of the pandemic,^{li} illustrates in the Arctic how different knowledge systems work together on health-related issues. It describes a human-animal-natural environment nexus by highlighting that human health cannot be achieved without an overall healthy ecosystem. In and beyond the Arctic, it is key to address different knowledges and include

Indigenous Knowledge-holders since the universal perspective on health is reflected in Indigenous approaches and is part of Indigenous value systems.^{lii}

The former EU Arctic Policy^{liii} with its three priority areas on climate change and safeguarding the Arctic Environment, sustainable development in and around the Arctic, and international cooperation on Arctic issues, already reflects the complexity of infrastructure challenges and the interplay of different policy levels in the Arctic region. Through directly referring to the 2030 Agenda for Sustainable Development,^{liv} the EU further contextualized its Arctic policy and created more policy coherence. However, so far these issues expressed in the priority areas have not been linked to infrastructure as such nor sufficiently to the local and urban level. By addressing the importance of issues related to Arctic local infrastructure and its inherent characteristic of connecting different challenges and governance levels, the EU policy could contribute to overcome sectoral approaches. I argue that infrastructure could provide a framework for the EU Arctic Policy to connect the different, overarching challenges and policies. By further following conceptual debates on transnational cooperation and multi-stakeholder approaches to implement global and regional arrangements locally, I also stress the relevance of the local and urban level as well as in how far the EU could address cities and urban centers more strategically.

To facilitate the inclusion of different perspectives, the European Commission and the European External Action Service initiated a consultation process to overhaul its Arctic Strategy in 2020. They received a broad range of input, first and foremost from academia and particularly from the social sciences. The three priority areas of the former EU Arctic Policy are still valid and even more relevant with view to evolving global and regional circumstances.^{Iv} At the Arctic Dialogue Meeting on February 23rd 2021, Michael Mann, the EU Special Envoy for Arctic Matters, further highlighted from the feedback the importance to keep the balance between environmental preservation and resource development for the benefit for Arctic inhabitants.^{Ivi} Moreover, he stressed that the Arctic beyond its regional scope. Concerning the role of cities, Michael Mann stated that he understands the EU Arctic Policy as the framework for policies and their implementation at the local level. Against this background, he named the formal structures the EU has in place for participation for local and Indigenous people, for instance hearings and stakeholder dialogues as well as ad-hoc meetings through their open door-policy.

How strategically embedded is the wider topic of infrastructure as well as the local and urban context in the current EU Arctic Policy? The policy from 2016 already addressed the different governance levels and actors, with which the EU seeks to work closely together. Moreover, the EU has certain programs and funding opportunities to support conventional infrastructure-related issues in the Arctic. When it comes to infrastructure the 2016 policy, for instance, speaks of the trans-European Network for Transport (TEN-T), a cross-border initiative for more sustainable transport modes. Other infrastructure-related policies included in the current policy concern other maritime activities and the EU's space technology. Moreover, the European Investment Bank funds genuine infrastructure projects that seek to improve transport connections over land, sea, and air as well as telecommunication. In addition, under the cohesion policy, the Northern Periphery and Arctic Programme as well as with the Interreg North Programme, the EU can financially support infrastructure projects in the European Arctic. However, these programs support the physical/material dimension of infrastructure. A more strategically driven and broadened approach towards infrastructure is not yet envisioned, nor are cities or urban centers particularly contextualized against the remote Arctic background.

To further approach the question of how infrastructure and the local/urban context can be better integrated into the EU Arctic policy, it is important to reflect on the remote context of the Arctic. One element of the remote Arctic is related to the internal and external dimension of remoteness. The Arctic is internally remote due to distances between Arctic regions themselves and a focus on North-South connection. It is further externally remote, because of the region's distance to other regions. In the Arctic context, the harsh climate and environmental conditions hinder access to the Arctic and connections between communities as well as mobility within the region due to overall higher cost of travel, time constraints and often-unsafe travel options (thawing permafrost, impairing ice-roads, rising sea level).^{1vii} Another approach to describe Arctic remoteness is presented by Berman and Orttung, lviii They define four dimensions of remoteness; geographic, economic, structural, and cultural. Geographic remoteness is described through the far distance from markets and centers of business. Economically remote refers to the separation of producers and consumers, which leads to high transportation costs, high business costs, and overall, less economic activity and higher costs of living. Because of the geographical location of remote areas, which determine its economic remoteness, the region does not have many economic and political connections to other regions and can be described as structurally remote in terms of political power. Less exchange with other regions can further frame the region culturally remote. For the EU Arctic Policy, this remote context and the key linkages to local infrastructures could inform a new overarching framework.

CONCLUSIONS

Since the European Green Deal is setting the umbrella for the new EU's policy for the Arctic, the Arctic becomes part of a greater picture and is linked to issues such as climate change and sustainable development in the EU and beyond. Thereby, the EU already reflected on the necessity of overcoming silo approaches. By aiming at a "clear and coherent Arctic policy",^{lix} through broadening the concept of infrastructure and clustering different initiatives under its framework, infrastructure could be utilized to address challenges more holistically. For instance, to ameliorate the connectivity among Arctic communities, a better inclusion of different actors could be achieved and facilitate more transnational exchange. A potential contribution could be the institutionalization of the European Arctic Stakeholder Forum, which was established with the former policy from 2016.^{Ix} Apart from only focusing on research activities, this scope could be widened by local infrastructure. This in turn, could contribute to a more holistic policymaking in and for the Arctic.

Within this group of actors, the Saami people are the only recognized Indigenous people in the EU that play a crucial role.^{1xi} Therefore, the EU needs to further strengthen existing Saami-EU exchange formats. The project "Filling the EU-Sápmi knowledge gaps" under the Interreg North Programme is a great example how the EU could engage further. The project seeks to "strengthen the relationship between Sápmi and the EU, through creating a knowledge platform on EU-Sámi relevant topics".^{1xii} Moreover, the EU-PolarNet, a European network for strengthening European Polar Research and policy advice, developed a "White Paper on Status of Stakeholder Engagement in Polar Research".^{1xiii} Just recently, at the 2021 Arctic Social Science Week (ASSW), they co-organized a workshop together with the Saami Council on "Co-Creating Arctic research together with Indigenous rightsholders". The EU should support platforms where this kind of exchange takes place and include different types of knowledges in their own approach to the Arctic, for example through specifically consulting Indigenous and local rightsholders. Thereby, the EU could also frame knowledges and research as infrastructure as well as reflect their characteristic of connecting different issues and policy levels.

These activities can go along with the EU's engagement in and for the Arctic Council (AC) as well through connecting different policy levels. As the most relevant pan-Arctic forum in the region, the AC can look back on 25 years of successful cooperation by following the method of knowledge cooperation, and informed policymaking. This is not only true for climate and environmental questions, but also for the most recent crisis of the pandemic, where the AC compiled an in-depth report on the impacts of Covid-19 in the region, ^{lxiv} which served as a briefing document for the Senior Arctic Official meeting that discussed policy measures.^{lxv} By linking different policy levels and acknowledging the framing potential of local infrastructure, the EU cannot only continue but intensify its strategic engagement.

Thus, the EU needs to stress the links between different dimensions and levels of Arctic infrastructure, existing inequalities as well as their interlinkages to sustainable development. To achieve an envisioned leadership role, the EU also needs to address and support local solutions for infrastructure challenges, which can be facilitated by transnational cooperation formats that thematize and not only include local perspectives. What kind of infrastructure do they need due to changing circumstances shaped by climate change and other emerging issues such as the pandemic? What are the lessons learned from the pandemic? Thereby, the EU also needs to acknowledge the remote context of the region, its different stakeholders, knowledge-holders and rightsholders and the specific implications for infrastructure related issues.

Chapter 5

SMART CITY POTENTIAL FOR THE ARCTIC

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EXECUTIVE SUMMARY

The development of the smart city concept and issues of smart urban planning have recently acquired high relevance. To date, academic inquiry and practical experience have shaped several approaches and methods for implementing this concept, aimed at ensuring sustainable development of cities and improving the quality of life for urban dwellers. The contradictions existing between the approaches and methods, as well as the ambiguity of the term "smart city" itself, necessitate a consideration of each approach in a geographically specific context. The same planning strategies applied to different territories can lead to different effects. Thus, the analysis of smart initiatives' realization and the particularities of their implementation in the context of the Arctic is relevant in view of natural, economic, social, cultural, and political characteristics of each sub-region within the Arctic. In addition, close attention in this regard must be paid to smart urban strategies implemented and planned for implementation in the Arctic zone of the Russian Federation since this territory has a very particular context, history of colonization of its population, and unique economic household and bureaucratic environment which still facilitates debates on which urban model is most suitable for the Russian Arctic. Among the approaches to formulating the concept of a smart city, the main ones are 1) restrictive (focusing on the inclusion of information and communication technologies (ICT) in the physical and service level of the primary urban infrastructure), 2) reflective (focusing on the "usefulness" of using ICT in urban infrastructure) and 3) rationalistic (determining the "smartness" of the city, i.e. its ability to meet the needs of residents and other stakeholders). The first two approaches are based on the technology driven method and seem more relevant for the development of Arctic cities when the priority of national policy is building up a resource-based Arctic economy. The third approach is based on a human-driven method and might seem more relevant for the development of the Arctic through the diversification of economic activities. However, having a brief look at most countries' Arctic strategies, including the one developed by Russia and its territorial entities, shows that the Arctic never encounters prioritization of one of these economic scenarios over the other: they both are necessary. This puts forward a problem of whether it's worth developing a holistic approach, or it would be more rational to alternate the approaches and to perceive them as stages of smart urban development.

Keywords: smart city, smart solution, sustainability, Arctic, urban planning

INTRODUCTION

As is indicated in the United Nations 2030 Agenda for Sustainable Development, the 17 sustainable development goals are set for all the participating countries and stakeholders to "free the human race from the tyranny of poverty and want and to heal and secure our planet" [1]. SDGs aim at shaping a coherent vision of the future and at directing everyone's efforts to contribute to the common good of the mankind. The document is to be used as a framework by decision makers, politicians, and businesses for the purpose of managing development in such a way it does not bring any harmful consequences to communities or the environment, directly or indirectly. In this respect, different countries and participating organizations find themselves in the same paradigm of sustainable development which can be promoted many various ways.

Irrespective of the fact that the notion of sustainable development is still lacking a uniform perception, it did not prevent the term from becoming "(T)he secular bible of global free markets ..." [2] which entitles it to being a subject of various interpretations like any other religious doctrines are. As stated by Timothy Doyle, in the 1980s and 1990s, when the notion became a kind of a buzzword in the western society, the term was used "like all other green symbols (...) to advocate radical and incremental environmental change" [2]. However, irrespective of the fact that at the time being the idea is promoted from the perspective of triple-bottom-line trajectory, promoting economic advancement through social equity and by incorporating environmental assets (rather than giving priority to environmental concerns) [3] [4], in the context of the High North the notion is often associated with environmental concerns, but not social or economic metrics. This is rational due to the nature is what differs the Arctic most from other territories of the globe. What is more, most of the Arctic's industries and social identities are deeply rooted in the northern specificity and particular legacies of exploitation [5]. By this we can conclude that in the Arctic context, sustainability as a goal has its own peculiarities dependent on the unique nature of the region.

The Arctic, despite its unique features, also does not stay away from global trends - globalization, digitalization, inclusion, and urbanization all touch the circumpolar north. Urbanization in a broader context can pose a challenge to sustainable development since urban territories concentrate much more industrial, environmental, and social challenges, including ones related to pollution, social (in)equality, and financial flows, which necessitate closer attention being paid to infrastructure management and planning. Of course, urban planning in Arctic territories has its own characteristics (as well as the understanding of sustainable development), due to unique climatic, historical, economic, and cultural factors. The Arctic is thus faced with a specific challenge in achieving the goals of sustainable development.

One of the solutions (according to some researchers, even a "panacea" [6] of the problem of urbanization in the last decade is seen in the idea of a "smart city". Accordingly, if the achievement of a special goal requires the settlement of a special challenge, then the solution will also presumably have its own characteristics (specific solution): implementation strategy and content of the idea of a "Smart city" and "Smart solutions" in the context of the Arctic will have their own distinctive features, due to all the same climatic, social, economic, and cultural factors. This fact is illustrated, for example, in the fact that the research thematic network of the University of the Arctic on smart cities is not called "Smart Cities in the High North", but "Smart Societies in the High North (Smart North)" [7], which reflects a special approach to the connotation of the term when applied to the Arctic.

ARCTIC CONTEXT OF SMART CITY CONCEPT

In addition to highlighting the challenge of applying the smart city approach to the Arctic's unique context, "Smart City" as an idea is itself an ambiguous one. If sustainable development enjoys a more or less generally accepted paradigm developed, then with smart city concept (despite the availability of a guide on smart cities from the International Organization for Standardization [8]), everything is somewhat more complicated due to the relatively recent introduction of the concept into everyday life, controversial views on the idea itself and due to the presence of related and similar concepts (innovative city, creative city, entrepreneurial city, digital city, etc.) [9].

In the classical sense, a smart city (or smart settlement) is a territorial-administrative unit that has in its primary urban infrastructure not only physical and service levels, but also an information layer between them, represented by information and communication technologies (sensors, cameras, etc.) that creates a "digital" mirror of the supply chain. Moreover, among all types of primary urban infrastructure (Transport, Energy, Telecommunications, Waste Management, Water Supply and Sanitation, Housing and Utilities and Green Infrastructure), Transport and Energy are primarily associated with a Smart city. Secondary infrastructure (Education, Nutrition, Culture etc.) is usually left aside.

The mission of managing any urban settlement is 1) ensuring quality of life, 2) attractiveness, and 3) the competitiveness of the settlement by resolving demographic, socioeconomic, technological, environmental, and financial challenges, and ensuring the sustainability, safety, and efficiency of the primary infrastructure. For this purpose, an information layer is introduced, the tasks of which are 1) optimization of infrastructure management ("quantitative changes", optimization) and 2) creation of new services based on information data and based on other services (and, accordingly, the creation of new business models).

In this regard, optimization of activities refers to a restrictive approach to the smart city concept, which focuses on methods of integrative development based on ICTs related to establishing a connection between elements of urban infrastructures (IoT) and data processing. In turn, creating new services is a reflective approach that suggests that technology develops human capital and further empowers citizens to innovate and participate in planning to solve basic problems and create a collective common good [11].

Despite the smart city framework's contributions to the field of urban planning, such a "technology-driven," the smart city model received wide criticism from the academic community: 1) Minimal consideration of social, cultural, regional factors; 2) ICT as a panacea for everything; 3) Security issues; 4) The issue of equality to services access; 5) The issue of the collision of economic and public policy; 6) The question of democracy role and the introduction of neoliberal ideas 7) and the question of taking into account the cultural heritage.

The technology-driven method, despite all the criticism, is important for development and the implementation of the first stages of planning of technology implementation and governance issues of those technologies. In the context of the Arctic agenda, this method can be quite successfully applied when the priorities of the national policy are ecology and building up the resource and economic potential of the Arctic (i.e., optimization of production / provision of services without the need for a widespread human presence in the Arctic and facilitating people's work etc.).

However, the vision of "smart" urban infrastructures is often reduced only to this method and to the use of ICT, ignoring social, cultural, regional, economic, and other factors. For example, if a public transport operator adjusted the bus schedule based on statistics on the number of people at stops, or if there is a mobile application with real-time bus traffic, but this does not reduce the number of private vehicles on the road or reduce CO2 emissions, this is truly a smart city feature? Or if the traditional reindeer husbandry is controlled exclusively by artificial intelligence, which leads to the loss of Traditional Knowledge? In other words, not every city with ICT in its primary infrastructure can be called smart.

That is why, a pragmatic approach to the idea of smart cities has developed, which opposes the first two approaches and is a feature of the human-driven method in implementing smart city solutions. Proponents of this approach suggest that smart urban planning should be stimulated by the community itself, while the development of human capital (competencies and capabilities) will lead to the active creation and use of the necessary technologies (including ICT based) in the context of the local community. In other words, smart cities need to focus more on empowering citizens to expand their competencies, skills and, capabilities to create and actively use innovative technology while solving their own problems [11]. This approach is focuses attention on the regional specifics of using planning techniques and technologies. This approach is much less developed, since it 1) represents the highest stage of urban planning (3 step - Citizen centered approach), to which not all initiatives have reached or is often completely ignored; 2) is poorly amenable to formalization or systematization. How the analysis can be performed then?

Very often intelligence is associated with the scale that ranges from being not clever to being smart. But to implement practical issues, it is necessary to approach smartness as a set or combination of characteristics, each of which can have a different degree of development. A similar assessment system was also proposed for the components of smart cities, which includes smart governance, smart economy, smart living, smart environment, smart people, smart mobility, smart energy [10]. This coordinate system is already less positivist and adds emphasis to people and culture. In addition, it is easier to justify the regional specifics here since the development of each individual segment essentially presupposes the understanding Arctic background of the problem and not only the introduction of a data layer between infrastructure and services. Concepts such as entrepreneurship, shared leadership, citizen participation, living lab or city lab are closely associated with this approach. In other words, the development of infrastructures is not imposed from above, but is initiated from below, since the key point here is the involvement of urban community in the development of urban infrastructure, and ICT is perceived as a tool rather than as a prerequisite.

This approach would be more relevant if the diversification of local economies is the priority of state policy in the Arctic activities and a systematic departure from exploration activities - i.e., people create conditions for themselves to live and work comfortably. Despite the presence of indicators for each of the described areas, the system also has some shortcomings. Each of the aspects is not considered in dynamics and is quite hard to analyze it quantitively. For example, some research suggests that the presence of a university or concert-hall, percentage of people possessing higher education, or total revenue generated in the region fall into the described scheme of Smart City evaluation [9]. No doubt, all these factors do have an impact on the local human capital, but how are they related to the performance of the Smart city? More regression model studies are needed to state this for sure.

CONCLUSION

In view of the previously stated inconsistencies and concerns, a critical approach has developed that casts doubt on the very existence of the smart city concept and the feasibility of attempts to implement it. However, due to the development of technologies, environmental instability, and various global challenges, urban planning and management will in any case be modified regardless of the city being "Smart" - and it will be necessary to consider the peculiarities of the territorial functioning which determines the choice of a human-driven or technology-driven method. What is more, more in-depth research is needed in relation to the case-studies and econometric methods of the territorial development in the Arctic for a better understanding of the peculiarities of practical households in northern cities. To perform detailed investigations, it is essential to determine specific Arctic urban problems and their reasons, such as massive outgoing migration, to identify which potential smart city solutions can be used for dealing with those issues. In addition, existing political initiatives and documents on the Arctic agenda are not limited only to "resource" or "human" potential of the Arctic - they are all complex and interconnected. Accordingly, the approach to planning a smart city should be comprehensive; it is necessary to integrate these two approaches simultaneously or alternate between them to resolve specific technological, economic, social, political, and legal challenges systematically and structurally to the development of urban infrastructure.



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INTRODUCTION

Communities around the world have been experiencing social, economic, and environmental challenges driven by climate change (IPCC, 2021). Among the various significant impacts of climate change is the increase in the frequency and severity of extreme weather events. These increased natural hazards combined with the vulnerability of infrastructure and communities often lead to rapid onset disasters (e.g., floods) resulting in loss of life, widespread damages, cascading failures of critical infrastructure, and supply chain disruptions, among other impacts. Additionally, slow-onset events (e.g., sea level rise, increasing temperature) threaten livelihoods in the long-term especially economic security, human migration, and accessibility to food, water, and energy. In the Arctic, climate change impacts are amplified and threaten the livelihood of some of the world's most vulnerable communities. The Arctic is warming at a rate of approximately twice the global average (Chapin et al., 2014). As temperature rises, permafrost is thawing at alarming rates, sea ice is melting, sea level is rising, and extreme weather events are becoming more frequent. These natural hazards can damage critical infrastructure (e.g., transportation) and accelerate Arctic coastal erosion which threatens coastal ecosystems, impacting the Arctic security, economy, and well-being.

With 80% of Alaska's surface lying above permafrost (Chapin et al., 2014) many of its highways, railroads, and buildings will require increased maintenance or rebuilding to account for potential damages in their foundation and structure. Similar issues are present across other infrastructure sectors including water, wastewater, power, and communication systems, Figure 1. Loss of clean water, saltwater intrusion, and sewage contamination from thawing permafrost are threatening the health of Arctic communities. Much of the infrastructure in the Arctic is either outdated or nonexistent, leaving Arctic communities struggling to access reliable critical services. Additionally, many Arctic communities (e.g., 85% of Alaska Native villages) are impacted by coastal erosion and flooding (Mittal, 2009), requiring them to relocate to safer areas. For example, in 2016, the residents of Shishmaref, Alaska, voted to relocate the village due to erosion and flood risk (Mele and Victor, 2016). However, the relocation which would cost millions of dollars still has not occurred due to lack of resources. The \$1.2-trillion infrastructure bill passed in November 2021 covers multiple infrastructure sectors and includes Alaska Native villages. The bill also includes funds allocated for relocation projects (\$130 million) and climate resilience efforts (\$86 million). However, with more than 30 Indigenous communities in Alaska threatened by coastal erosion, the allocation of resources must be strategic, fair, and equitable.

The impacts of climate change in the Arctic are multidimensional and present unique challenges that are at the intersection of the infrastructure, social, and environmental systems, leaving Arctic communities in imminent threat, Figure 2. To protect Arctic communities from rapid- and slow-onset disasters while preserving traditional knowledge and practices, planning for resilience must address (i) system interdependencies, (ii) open data initiatives, and (iii) climate adaptation.



Figure 1: Abandoned home near the coast of Shishmaref, Alaska where buildings and water infrastructure are damaged by the rising tide (Hislop, 2010)



(a)

(b)

Figure 2: The safety and health of Arctic communities threatened by climate change and infrastructure vulnerability. (a) A sea wall on the coast of Shishmaref is no longer protective due to higher storm surges (Hislop, 2010). (b) Seal hunting, essential to the livelihood of the Inuit of Pond Inlet, Nunavut becomes riskier with earlier sea ice melting (Prokosch, 2013).

ACCOUNTING FOR SYSTEM INTERDEPENDENCIES

Interdependencies are typically considered to be interactions between infrastructure systems that often lead to unexpected consequences during disruptions where failure in one infrastructure leads to cascading failures in other infrastructure sectors (Rinaldi et al., 2001). An additional layer of interdependencies between humans and infrastructures (i.e., community impact and policymaking) further amplifies these complex interactions (NIST, 2016). When considering the impact of climate change and extreme weather events, a third layer of interdependencies between humans, infrastructures, and the environment must be considered (Markolf et al., 2018). Resilience efforts that focus on siloed systems without considering their interactions with other systems may lead to suboptimal outcomes. In the case of the Arctic, system interdependencies are complex because they are uncertain, and they change over time in response to disasters, dynamic coastal systems, climate, migration, and policymaking. Addressing dynamic and uncertain interdependencies helps better understand system behavior and ensures that planning for resilience is equitable by accounting for multiple dimensions (social, economic, environmental) in future scenarios and outcomes (Reilly et al., 2021; Yu et al., 2019).

SUPPORTING OPEN DATA INITIATIVES

Understanding and planning for system interdependencies requires coordination among multiple stakeholders and agencies and relies on information sharing across heterogeneous systems. Open data initiatives can facilitate resilience planning, especially in the Arctic where data is often lacking and inconsistent across different communities and sectors. Shared and open data is common in the research community. Specific data repositories have helped advance various research areas such as DesignSafe in the field of natural hazards engineering (Rathje et al. 2017). In addition, open data initiatives have become more common among governments to support transparency of processes, encourage stakeholders to act on social issues and create new services, and achieve participatory governance (Attard et al., 2015). Open data initiatives are of utmost need in the Arctic where data presents varying levels of reliability across Arctic nations. An Arctic open data initiative must include both scientific and traditional knowledge data to guide future policymaking and resilience planning. Recent initiatives include the National Science Foundation (NSF) Arctic Data Center which helps in the reproducibility and preservation of products of NSF-funded science in the Arctic.

INVESTING IN CLIMATE ADAPTATION

Understanding complex system behavior and sharing knowledge about their interactions constitute one aspect of planning for Arctic infrastructure and community resilience. Another critical aspect is financing these plans. While the Arctic presents unique challenges, it is also a place of unique opportunities that allow creativity in resilience solutions. As governments are rethinking infrastructure development, there is an opportunity to invest in climate adaptation strategies that ensure the new and improved infrastructure will withstand future climate scenarios and not only focus on mitigating historical events or fixing the current problems. Integrating climate risk in financial decision-making is essential to inform investment in climate resilient infrastructure (CCRI, 2021). This requires new methods that quantify the return on such investment (Espinoza et al. 2020) to demonstrate the need and benefit of climate adaptation strategies as well as standardized data and tools that enable such methods to incorporate multiple sectors in infrastructure, social, and environmental systems. Chapter 7

Arctic Science Diplomacy for Chinese Scientists: All Action and No Talk

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INTRODUCTION

"The concept of science diplomacy is gaining increasing currency in the US, UK, Japan and elsewhere." ^[1] Up to now, a large literature has been accumulated over decades in this area in the West. Under this fashion led by international counterparts, with China's increasing engagement in Arctic affairs in 21st century, China's science diplomacy in the Arctic raises concerns among Chinese researchers on the Arctic including Yang Jian, Yu Hongyuan, He Jianfeng, Zhang Fang, Su Ping and Zhang Lulu.^[2] And according to the 2018 speech by then Minister of Science and Technology of the People's Republic of China, "science and technology diplomacy has become an important part of China's overall diplomatic strategy"^[3]. As China's Arctic Policy White Paper issued in January 2018 reads, "When participating in Arctic affairs, China prioritizes scientific research."^[4] There are strong evidences that are able to support these overall positive views on China's Arctic science diplomacy.

Significant efforts in this regard that have much to do with Chinese scientists mainly include: 1. China obtained its membership in the International Arctic Science Committee in 1996; 2. Since 1999, China has organized 11 scientific expeditions in the Arctic with its research vessel Xue Long (Snow Dragon); 3. In 2004, the Yellow River Station, China's first Arctic observation station, was established in Svalbard; 4. The year 2005 saw China as the first Asian country to host the Arctic Science Summit Week, a high-level conference on Arctic affairs; 5. In October 2018, China-Iceland Arctic Research Observatory (CIAO) was formally opened; 6. In 2019, China's first self-built polar icebreaker Xuelong 2 was launched to boost China's polar research and expedition capabilities; 7. China's polar-observing satellite started its Arctic mission in June 2020.^[5] China also supports international cooperation through such platforms as the Arctic Science Ministerial Meeting. In the past two decades, "China has gradually established a multi-discipline observation system covering the sea, ice and snow, atmosphere, biological, and geological system of the Arctic." ^[6] Looking into the future, in order to fulfill one of China's policy goals on the Arctic---- "to understand the Arctic, China will improve the capacity

and capability in scientific research on the Arctic."[7] The 14th Five-Year Plan for the National Economic and Social Development of the People's Republic of China and the Outline of the 2035 Long-range Goals issued in March 2021 clearly stipulate that the second phase of Xuelong Polar Exploration will be carried out, as well as heavy icebreakers and other cutting-edge areas of science and technology.

Following the brief review and outlook on capacity building of China's Arctic science diplomacy as above, inquiry about the interaction between science and diplomacy in China becomes the initial drive to write. This paper aims to explore this broad topic from a small angle, focusing on Chinese scientists who are supposed to conduct science diplomacy along with those science and technology diplomats on behalf of China. For this purpose, interviews with Chinese scientists in person compose the most important methodology for this study. Against this backdrop, research questions are put forward herein: How do Chinese scientists understand the term "science diplomacy"? What does it imply for China's Arctic policymaking?

UNDERSTANDING SCIENCE DIPLOMACY BASED ON PERSONAL EXPERIENCES

In general, Chinese scientists fall into three categories roughly in terms of generation, status and strategic vision, showing a pyramid structure. At the upper level, those academicians who are in charge of national key laboratories and major international projects tend to think strategically, collaborating with overseas counterparts as well as holding higher administrative positions. In many cases, human well-being and national interests for international scientific cooperation are their primary concerns. At the lower level, middle-aged professor-level scientists are the backbone, while assisting academicians with their work and mentoring young scientists to grow. They are qualified to play a constructive role in international academic circles and have access to international organizations and high-end inter-governmental platforms. At the bottom there are amounts of early-career scientists who are committed themselves to examine their research output with the Key Performance Indicator (KPI). Opportunities for these scientists in this kind to make a name for themselves among peers are not so available unless they are extremely extraordinary. Understandings on science diplomacy from Chinese scientists as follows are not exclusive to any type of these three, which is more of a complex instead. In terms of science diplomacy, "all action and no talk" is basically what Chinese scientists uphold in their daily work.

First, the cause-effect of science and diplomacy worth further exploring. For Chinese scientists, science diplomacy is a term that they are not quite familiar with, while they are interested in learning more about it from political scientists. In their opinions, science itself exists for the common good, focusing on knowledge production, sharing and application in a right way. International scientific cooperation is required to serve all mankind well and may be the icing on the cake of a country's diplomacy. Given good diplomatic relations between two countries, scientific results are likely to come at just the right time.

However, international scientific cooperation cannot deduce any significant diplomatic results directly. Scientific cooperation alone, as a single variable, does not determine the diplomatic situation of a country. Comparatively speaking, diplomacy can play a bigger role in science than science in diplomacy. In this regard, the former leader of Soviet Union Gorbachev's 1987 speech in Murmansk was a classic model, a powerful political leverage to restart international scientific and technological cooperation in the Arctic under the Cold War. The decisive diplomatic mode of a country is dominated by its comprehensive strength in nature. China's overall capacity in science and technology in the world still falls behind the West, or at most in parallel in some area, rather than in the lead. With that in mind, for China it is not appropriate if science diplomacy is labeled as a public sloganeering.

Second, there are marked differences between international Arctic governance system and China's corresponding scientific institutions and mechanism. In terms of scientific governance systems and mechanisms, to some extent there is a disconnection between China and western countries. The operating mechanisms in the West are completely different from those in China, which makes the starting point, the logic and the philosophy in the area of international communication and exchange does not match well. Considering the cultural differences, the original design idea of the international mechanism may not be exclusive, but the actual effect is exclusive in a sense for non-western countries. While it is much easier for Japanese and Korean scientists to cooperate with western colleagues than Chinese scientists. For Chinese scientists, the adaption process is definitely a long way, and they are expected to do more to gain international respect and reputation with high-quality and reliable research achievements.

In promoting international scientific cooperation, the role of Chinese scientific associations is not as important as that of international ones on the whole. It is generally up to each research institute to deal with international scientific associations directly or, if necessary, with its domestic counterparts. A specialized training mechanism for Chinese scientists is in need, helping them to adapt to the work culture in international scientific organizations and associations related to the Arctic such as the World Meteorological Organization (WMO), International Arctic Scientific Committee (IASC) and International Union of Geodesy and Geophysics (IUGG).

Third, taking lessons drawn from previous practices is highly recommended. China's technological advances are increasingly a double-edged sword for its participation in Arctic affairs. Though China's scientific presence in the Arctic is being accepted at large, when comes to China's expected influences projecting in the Arctic region, its military and civilian integration has been a core concern from the outside world. A well-known case came in May 2017. "A ceremony was held in Kangerlussuaq, Greenland's airport hub, to launch a process intended to lead to the establishment of a satellite ground station to be used for climate change research, which could also be used for the dual-use Beidou navigational system."^[8] As the Pentagon of the United States warned in 2019, "China could use its civilian research presence in the Arctic to strengthen its military presence, including our deployment of submarines-including deployment of submarines to the region as a deterrent against nuclear attack."^[9] Obviously expression like this is merely subjunctive, implying a disagreement with facts in the past.

However, "suspicions about China's Arctic presence results, to begin with, from the dynamics of a global power shift."^[10]

With the latest development of Arctic strategy environment and geopolitics in the context of Covid-19 pandemic, it's not easy to gain favorable public opinions in the Arctic for China confronting US rivalry. Based on these considerations, to avoid stoking the narrative of "defining Chinese threat in the Arctic", it is wise for Chinese scientists to keep a low profile. After all, ideological biases take time to change.

IMPLICATIONS FOR CHINA'S ARCTIC POLICYMAKING

According to the definition from Royal Society widely accepted by the international community, "It(science diplomacy) is still a fluid concept, but can usefully be applied to the role of science, technology and innovation in three related areas: informing foreign policy objectives with scientific advice (science in diplomacy); facilitating international science cooperation (diplomacy for science); using science cooperation to improve international relations between countries (science for diplomacy)."[11] In this framework of conceptualization of science diplomacy, three pillars of China's science diplomacy in the Arctic can be described as follows in a broad sense. Pillar One, on China's side the application of "science in diplomacy" is in a period of rapid growth and obtaining the permanent observer status of Arctic Council was a beginning. By far, Chinese scientists have served for two-thirds of Working Groups of the Arctic Council and are playing an increasingly constructive role in addressing climate change on the platform such as the Intergovernmental Panel on Climate Change (IPCC). Pillar Two, as mentioned above, the establishment of the Yellow River Station and the CIAO is a typical case of "diplomacy for science", strongly promoting the scientific cooperation between China and Arctic States. Pillar Three, the China-Nordic Arctic Cooperation Research Center (CNARC), established at the end of 2013, has profoundly explained the value and significance of "science for diplomacy". In the same way, the following will be a one-to-one analysis about how these understandings of Arctic science diplomacy from Chinese scientists impact China's Arctic policymaking.

First, to strengthen the pillar of "science in diplomacy", it is necessary to speed up the localization of the concept of science diplomacy or science and technology diplomacy in China. It should be a mission for Chinese political scientists to do valued specific research in this field, just as the concept of "soft power" from Joseph Nye has been usually used as "cultural soft power" after it was introduced to China. What's more, a consensus about the connection between science and diplomacy as well as politics should be addressed for collective and collaborative actions at the diplomatic level. To make China's Arctic policy informed in the area of science, technology and innovation, enlarged participation in Arctic policymaking by Chinese scientists should be encouraged highly. On this account, in China the advanced expert consulting and communication system between scientists and diplomats in particular deserves to be developed and improved.

Second, to empower the pillar of "science for diplomacy", straightening Chinese and international mechanism on scientific cooperation ought to be a priority for China's Arctic policy makers. As a common

language for scientists around the world, "science provides a non-ideological environment for the participation and free exchange of ideas between people, regardless of cultural, national or religious backgrounds."^[11] In this context, promoting scientific cooperation across borders can be an irreplaceable part of diplomatic toolbox. *Antarctic Treaty* signed in 1959 to which scientists made great contributions already sets a good example to follow for late comers. To leverage science into diplomacy, necessary reform of domestic systems and mechanisms on scientific research should come first. As long as the potential of scientists as diplomats gets unleashed, the dynamics of China's Arctic science diplomacy can be ensured and energized. In the same time, it's better to make Chinese scientists believe that scientific cooperation may not change international relations fundamentally, but it can act as a catalyst for a better situation.

Third, to consolidate the pillar of "diplomacy for science", for Chinese science and technology diplomats in the Arctic there should be a clear boundary between "dos" and "don'ts" when dealing with specific issues. As to the application of advanced Chinese science and technology, Chinese diplomats can bridge the Arctic enterprises and Chinese scientists, promoting the completion of major scientific and technological cooperation projects with the win-win principle. Plans for effective responses to possible unfavorable local public opinion should be fully taken into considerations in China's Arctic policy-making process. Considering "the return of great power competition as the dominant current global paradigm"^[12], the biggest challenge in the Arctic facing both Chinese diplomats and scientists might be the unjustified over-politicization of scientific and technological cooperation and collaboration. Related to it, regardless of state-owned or not, in the Arctic China's high-tech companies including Huawei who has lots of scientists both home and abroad are being suppressed by individual sovereign state. If things continue this way, whether there is an emerging "science and technology war" in the Arctic region deserves concerns.

Conclusions

This paper is not to provide a general review of China's Arctic science diplomacy with amounts of literature and materials, instead it tries to present one or two qualities featuring China's science diplomacy mainly based on restricted interviews and communications with Chinese scientists since 2018. This study is to continue in years to come, significant findings might come on the way. So far, though, we have some clues as well as aspirations for further profound research in the future as conclusions drawn from this paper.

First, China's Arctic science diplomacy in practice goes ahead of that in theory. The era of a data-driven "science diplomacy 2.0"^[13] is coming, while here is a knowledge gap about the concept of "science diplomacy" among Chinese scientists. The concept of "science diplomacy" is not as popular as that in the West among scientists and policy makers. For individual Chinese scientist, the consciousness to be a science diplomat is still vague in their mind, nor is there much appealing for them to label their actions as science diplomacy. However, as elaborated previously, what China has done in the Arctic in promoting international scientific cooperation is actually what the term "science diplomacy" defines in theory in terms of "science in diplomacy", "science for

diplomacy" and "diplomacy for science". Given the potential of Chinese scientists in science diplomacy is fully realized, China's Arctic science diplomacy characterized by transparency will be elevated to a new level.

Second, the connection of international and domestic systems in science, technology and innovation matters for a greater success of China's Arctic science diplomacy. On China's side, it is wise to reform itself to remove systematic obstacles for better performance of Chinese scientists in Arctic global governance. Among countermeasures, in accordance with international practice, placing China's scientific associations where scientists are affiliated to in a more prominent position when initiating or participating in international scientific cooperation projects is pressing. It may be a "safer" and an effective way to de-politicalize scientific issues especially when it comes to some "sensitive" international relations. In the meantime, it's recommended for Chinese scientists to join international training programs such as *"the United Nations Diplomacy 4.0 Training Program"*^[14] which includes a special module Science Diplomacy . Fortunately, Chinese scientists with overseas study and work experiences have begun their attempts in this aspect, gaining more about science diplomacy through special programs.

Third, the key to strengthen China's science diplomacy lies in the balanced and sustainable interaction between science and diplomacy as well as politics. A deeper reason why Chinese scientists tend to uphold the attitude of "all action and no talk" in science diplomacy is that they are not sure about the relationship between science and diplomacy as well as politics. Chinese scientists believe that those great ideas for a creative diplomacy, for instance, "Pingpang Diplomacy" which fuels the normalization of China-US diplomatic relations in 1972, absolutely belong to those great politicians rather than pure scientists, and it seems to be safe for scientists to keep a distance from politics as well as diplomacy. These thoughts surely can be borne out by lots of diplomatic cases in history, but what's more, it reminds China's Arctic policy makers of the importance of balancing science and diplomacy as well as politics.

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Chapter 2 - Houselessness in Alaska: Myth vs. Data

ⁱ This material is based upon work supported by the National Science Foundation under Grant No. <u>2103556</u>. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

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