



CLIMATE-FRAGILITY RISK BRIEF

THE ARCTIC

By Marisol Maddox

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CLIMATE-FRAGILITY RISK BRIEF: ARCTIC

AUTHORED BY

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INTRODUCTION

Climate change is manifesting in the Arctic three times faster than the global rate of change. These changes present both risks and opportunities. Without proper risk mitigation and climate adaptation efforts, however, the opportunities will likely be undermined by the destabilizing, compounding effects of runaway climate change.

Risks from climate change come not only from the direct impacts but also from the way it interacts with other factors to challenge human and civil security, ecosystem health, and the geopolitical environment. Countries with authoritarian characteristics, such as Russia, are sensitive to domestic unrest challenging regime strength. Challenges to domestic stability will only be amplified the more climate change is allowed to accelerate unabated—with Russia facing significant levels of risk—and with implications for the international security environment.

Arctic risk mitigation can only be achieved through appropriate regional policy actions combined with global efforts to reduce emissions. Actions should follow the precautionary principle and avoid significantly externalizing costs. Like biodiversity loss and the risks of pandemics, climate change is one of several emerging actorless threats. This new category of threats challenges conventional ways of thinking about security, which have traditionally been based on state and non-state actor threats.

There is significant momentum in Arctic economic development, including further expansion of the already significant blue bioeconomy. At the same time, the region is in flux due to shifting ecosystem dynamics related to changes in salinity, temperature, pH, the spread of harmful algal blooms, and new interactions between species as habitats shift, among other significant changes. Additionally, increased activity in the region could lead to environmental contamination, such as oil spills, which could compromise the integrity of the marine environment and hence diminish the economic potential associated with it.

As Arctic sea ice retreats and the region becomes more accessible, commercial, civil, scientific, and military activities are increasing. At the same time, mechanisms for reducing risks and capabilities for responding to incidents associated with that activity remain fairly low. Vast distances and lack of supporting infrastructure hinder response operations.

The premier intergovernmental forum for regional cooperation is the Arctic Council, which has been successful in promoting cooperation even during times of geopolitical tensions. However, as the Arctic experiences profound changes due to global warming, it is increasingly urgent to adapt governance and international legal mechanisms to reflect the new reality and prevent gaps from emerging.

As climate change accelerates in the Arctic, there are other emerging threats of note, including the potential for unilateral deployment of geoengineering technology and the expansion of transnational criminal activity in the region.

Arctic changes loom largest when considered within the context of globally interconnected systems. The Arctic faces several climate tipping points, including permafrost thaw, the stability of the Greenland ice sheet, and the stability of the Atlantic Meridional Overturning Circulation (AMOC), commonly referred to as the Gulf Stream. The effects of these changes manifest globally. Palpable climate change in the Arctic serves as a harbinger of the threats to come if nations do not sufficiently curb emissions to avoid destabilizing complex systems.



CLIMATE CONTEXT

The Arctic is experiencing anthropogenic climate change at three times the global rate of change (AMAP, 2021). The polar ice cap has been shrinking and thinning as longer periods of warm weather erode multi-year ice buildup. The Arctic's sea ice minimum reached its second lowest level on record in 2020 (Ramsayer, 2020). The ice-covered Arctic used to act as a “graveyard for storms,” but the positive feedback loop of warming waters and diminishing ice is causing these storms to not only not die, but to actually regenerate and gain power (Francis, 2021). These changes result in impacts on coastal communities which simultaneously experience more powerful storms as well as the loss of land-fast ice that has traditionally served as a buffer against winter storms. A U.S. Army Corps of Engineers report identified over thirty Alaskan communities that likely will need to be relocated due to serious threats from environmental change (U.S. Army Corps of Engineers, 2009).

Environmental changes in the Arctic have global consequences. A 2021 study traced the geochemical thumbprint of atmospheric vapor from a major European snowfall event in 2018, referred to as the “Beast from the East” to the Arctic. According to the study, 88% of the snow that fell in Europe was linked to the long-term decline of Arctic sea ice and subsequent warming of waters, particularly in the Barents Sea (Bailey, 2021).

Significantly, some changes are manifesting faster than climate models have forecasted. For example, the extent of the loss of land-based ice from the Greenland ice sheet in 2019 was not expected until the year 2070. In just one day during the month of July 2019 - the hottest month on record - the 12.5 billion tons of ice loss from the Greenland ice sheet alone was enough to cover all of Germany with almost 7cm of water (Stendel, 2019). The Greenland Ice Sheet has experienced five record-breaking melt seasons since 2000, with the most recent occurring in 2019. Because climate model projections generally demonstrate sea ice decline as a linear, rather than accelerating process, they “may be collectively underestimating the rate of change,” which is why their projections have been outpaced by reality (Peng, 2020). This same research demonstrates that the Arctic Ocean will likely be seasonally ice-free by 2034.

Research shows the long-term loss of sea ice, and subsequent decrease in the albedo effect—the degree to which something reflects solar radiation—has intensified global warming by 25-40% (Duan, 2019). As sea ice melts, the albedo effect is decreased in polar waters because the darker color of open water tends to absorb heat that would otherwise have been reflected by the light color of ice. Black carbon pollution, including from agricultural burning, diesel generators, and the use of heavy fuel oil (HFO) in Arctic shipping, contributes directly to localized warming as dark soot particles land on the ice. Their dark color consequently absorbs heat and increases ice melt, thereby contributing to the feedback loop of warming and melting.

The International Maritime Organization (IMO), a UN agency responsible for setting global standards for safe shipping, adopted the Polar Code in 2014, which creates requirements for vessels seeking to operate in the polar regions. In 2020 the IMO members negotiated a phase-out on the use and carriage of HFO in the Arctic, but received criticism for being insufficiently effective at reducing risk due to its numerous exemptions and waivers through 2029 ((Barford and Gamble, 2021). (Incidentally, the use and carriage of HFO in Antarctica has been banned since 2011). The risks from HFO are twofold: its use directly undermines the albedo effect, and its carriage presents an oil spill risk which, given the limitations to a timely and effective response, has been identified by the Arctic Council as a significant risk (Arctic Council, 2020).

Fish stocks are moving towards the poles as the world's ocean surface temperatures increase. However, there are potential constraints to this poleward movement in the Arctic, which are related to changes in salinity, the depth of the Central Arctic Ocean, and the fact that colder waters tend to acidify faster than warmer waters due to their greater uptake of carbon dioxide (Union of Concerned Scientists, 2019). Nevertheless, polar fish and ice-associated species are experiencing a contracted habitat range as well as new predator-prey dynamics as temperate species expand into the polar regions (Meredith, 2019). There has also been an emergence in recent years of harmful algal blooms, which are thought to be activating as Arctic waters are warming. These algal blooms release neurotoxins which are poisonous to both humans and animals, compromising the integrity of the marine food chain (Anderson, 2018). Greater understanding of these evolving dynamics, including the potential for the Central Arctic Ocean to one day be host to a sustainably managed commercial fishery, will be ascertained through the joint program of scientific research and monitoring mandated by the International Agreement to Prevent Unregulated Fishing in the High Seas of the Central Arctic Ocean, which will also ban commercial fishing in the Area for sixteen years once the treaty comes into force (Gold, 2020).





Tipping Points

The Arctic is home to several significant climate change “tipping points”—abrupt and potentially irreversible changes in the thresholds of the Earth’s systems at which an additional incremental change can result in a major shift in the state of the system, often accelerated by feedback loops. Thus, these climate impacts, while originating in the Arctic, will have cascading effects on the entire Earth system. It is unclear whether it is possible to overshoot thresholds, by how much and for how long, and still remain safe (Ritchie, 2021). There is a risk that crossing the threshold of one global climate tipping point could destabilize other tipping points, creating a domino effect of major global change (Wunderling et al., 2021). Thus, the safest course of action is to avoid testing the boundaries of tipping points by prioritizing emissions reduction and carbon sequestration efforts.



Greenland Ice Sheet

There is about seven meters worth of global sea level currently locked up in the Greenland ice sheet (Nghiem, 2012). Greenland is melting from the top down, and as the ice melts it loses elevation. At lower elevations, the air generally is warmer, which further adds to the positive feedback loop of warming and melting (Csatho, 2014). Research also demonstrates the Greenland Ice Sheet is melting from below (Buckiewicz, 2020). Experts have found a very high probability of global sea level rise of between 51 and 178 cm by 2100 under an uncurbed warming scenario of +5 °C (Bamber et al., 2019). The same research finds it plausible that sea level rise could exceed 2m by 2100 if greenhouse gases are not sufficiently curbed, which “could result in land loss of 1.79 M km², including critical regions of food production, and displacement of up to 187 million people.”

Research has demonstrated the global climate impacts of diminishing land-based ice from Greenland, such as the established connection between Greenland’s ice melt and a “drastic decrease” in West African monsoon precipitation, which impacts the fragile Sahel region of Africa (DeFrance et al., 2017). It has also been recently discovered that around 42 tons of dissolved mercury is annually entering the ocean due to southwest Greenland ice melt, which has potential implications for the marine food chain (Hawkings et al., 2021).



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Permafrost Thaw

Permafrost thaw releases carbon dioxide and methane, the latter being more than 25 times as potent as carbon dioxide at trapping heat in the atmosphere. Over 80% of Alaska and over 60% of the Russian Federation are underlain by permafrost. Its thaw has serious implications not only for the climate but also for critical infrastructure and public health. Thawing permafrost has been shown to release ancient microorganisms such as viruses, bacteria, and fungi. This presents a public health threat due to the potential for the release of novel pathogens or unknown genotypes of already existing pathogens (El-Sayed and Kamel, 2020). Permafrost thaw is also resulting in the release of harmful levels of radon—which the U.S. Environmental Protection Agency has identified as the second leading cause of lung cancer— as well as mercury. Without emissions reduction to limit the amount of permafrost thaw, the mercury released could pollute soils, rivers, the ocean, and the atmosphere (Schaefer, 2020).

The role of subsea permafrost in the global carbon cycle is an emerging field of interest to climate scientists and modelers. It is not currently factored into climate models, but its role is significant as approximately 60 billion tons of methane and 560 billion tons of carbon are trapped in subsea permafrost, sediment, and soils (Sayedeh et al., 2020). The ecosystem feedback role of subsea permafrost is essentially absent from climate policy discussions. Considering its role adds further urgency to limiting global warming.

Collapse of the Atlantic Meridional Overturning Circulation (AMOC)

“Never before in over 1000 years the Atlantic Meridional Overturning Circulation (AMOC), also known as Gulf Stream System, has been as weak as in the last decades” (Caesar, 2021). Increased rainfall, coupled with greater melting of the Greenland Ice Sheet, adds significant amounts of freshwater to the ocean. This reduces the salinity and density of the ocean water, which in turn inhibits the sinking and continuation of the current’s flow—hence it slows down. The scientific community generally agrees that ocean circulation in the North Atlantic will likely continue to weaken. If this occurs concurrently with a period of reduced solar activity due to natural variability, the result could be decades-long mega-droughts in Central Europe like those experienced in the last millennium, posing tremendous social and political challenges (Ionita, 2021).



SOCIO-ECONOMIC & POLITICAL CONTEXT

Governance

The Arctic has been exceptional in its ability to primarily be a region of peace and cooperation, even during times of heightened geopolitical tensions. Rule of Law has prevailed and the Arctic Council has emerged as the preeminent forum for cooperative efforts-- both of these have served as stabilizing forces in the region. The dramatic impacts of climate change on the Arctic present challenges to governance that must be addressed so as to maintain stability and trust.

Since its inception in 1996, the Arctic Council has become the premier intergovernmental forum in the Arctic. The Arctic Council is a consensus-based organization with a two-year rotating Chairmanship. The Russian Federation will hold the Chairmanship of the Arctic Council, as well as of the two voluntary bodies of the Arctic Coast Guard Forum and the Arctic Economic Council, from May 2021-May 2023. The eight Arctic nations surrounding the Central Arctic Ocean— Canada, Denmark (Greenland), Finland, Iceland, Norway, Sweden, Russia, and the United States—make up the core members with voting privileges. There are six Permanent Participants with full consultation rights, representing the major Indigenous Peoples' groups of the Arctic who make up around one eighth of the region's 4 million people. To demonstrate the global interest in the Arctic one has only to look at the number of non-Arctic states with Observer status at the Arctic Council, which number 13; over half of which have attained Observer status since 2013.

In the past decade, five legally binding international agreements have been negotiated for the Arctic. The Arctic Council has provided the auspices for the negotiation of three of those agreements: on search and rescue, on marine oil pollution, and on scientific cooperation. The International Maritime Organization has produced the Polar Code to better manage Arctic shipping. Finally, there is the International Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, which came into force in 2021.

The resulting patchwork of agreements cover various aspects of Arctic governance to help promote stability and provide assurance in the region, both of which are crucial to maintain. But it is also important to recognize potential gaps and redundancies as the region evolves, and to take appropriate steps to fill them. “The Arctic Council, without legal personality, without dedicated and predictable funding, and without the ability to bind its members to decisions, cannot on its own serve as the international regime through which states can actually achieve effective ecosystem-based management throughout the Arctic Ocean” (Balton, 2021). Negotiations are currently underway for the creation of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and use of marine biological diversity in areas beyond national jurisdiction, commonly referred to as the BBNJ agreement. Questions emerge regarding what this agreement will mean for the Central Arctic Ocean Fisheries Agreement once it comes into force, and what the role of the Arctic Council will be (Balton, 2019).

In the 2021 Global Trends Report, the U.S. National Intelligence Council found that competition for influence by authoritarian powers “probably will make it harder to maintain commitment to many established norms and to develop new ones to govern behavior in new domains, including cyber, space, sea beds, and the Arctic. Existing institutions and norms are not well designed for evolving areas such as biotechnology, cyber, and environmental response and for the growing number of new actors operating in space.”

Recommendations for strengthening the position of the Arctic Council for the turbulent years ahead include the development of a long-term strategic plan, dedicated and transparent funding, a consolidated secretariat, and higher levels of accountability for implementation of decisions made by members (Balton, 2020). An additional recommendation is for the creation of a marine science body for the Central Arctic Ocean, to fulfill the role of the Joint Program of Scientific Research and Monitoring mandated by the Agreement. This body could eventually develop a management function, similar to the OSPAR Commission which services the Northeast Atlantic.



Economic Development



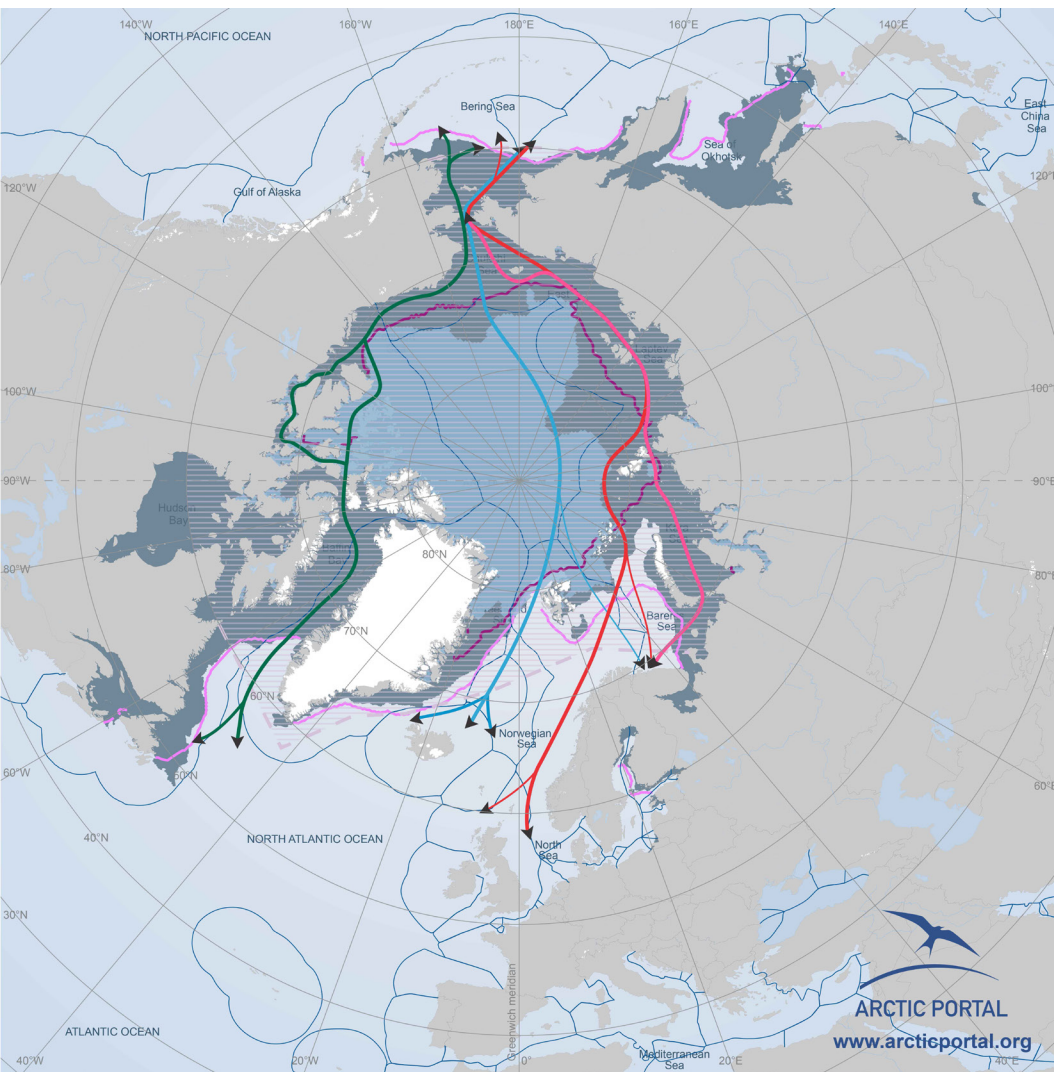
Arctic Shipping

There are three emerging maritime transit routes in the Arctic: the Northern Sea Route, the Northwest Passage, and eventually a Trans-Polar Route over the top of the Earth. Russian President Vladimir Putin has prioritized development of the Northern Sea Route and issued a decree to ramp up cargo tonnage even though there is insufficiently developed response capability in the event of an incident involving pollutants or requiring search and rescue.

As the Arctic ice cap retreats and thins, northern maritime routes are gaining attention, notably from commercial actors. The Northern Sea Route (NSR) is the most rapidly emerging route, largely due to the commercial ambitions being pursued by the Russian Federation. After the 2021 Suez Canal incident with the Ever Given, Russia took the opportunity to advertise the NSR as an alternative maritime route that cuts around 4,000 nautical miles off the trip between Asia and Europe. However, the Suez sees upwards of 1 billion tons of cargo annually, whereas the NSR set a record in 2020 with just 32 million tons of cargo traffic. Russian President Vladimir Putin has decreed that the NSR is to realize 80 million tons of cargo by 2024, but the NSR has depth and width constraints which limit the extent to which it could be considered a commercially viable cargo transit route. The Laptev Strait, for instance, limits vessels to a 12-meter draft, which constrains the cargo limit to 4,500 TEU versus the 25,000 TEU limit of the Suez Canal.¹

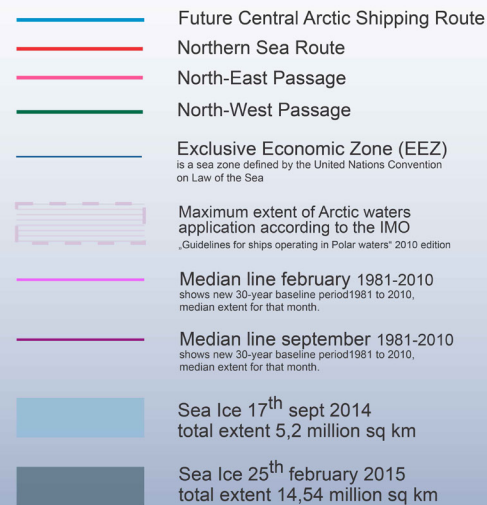
¹ TEU stands for Twenty-foot Equivalent Unit, a container comprising some 33m³.

© Arctic Portal Source: Arctic Portal, NSIDC, AMAP, Northern Sea Route Information Office, IMO. Retrieved from: <https://arcticportal.org/maps/download/maps-shipping/2417-arctic-sea-routes-ice-conditions-eezs-imo-delimitations>.



Arctic Sea Routes

with Exclusive Economic Zone limits,
the IMO Code for Ships Operating in Polar Waters,
and Sea Ice Conditions



Source:
AMAP, Northern Sea Route Information Office,
NSIDC, International Maritime Organization
edited by Arctic Portal

While Russia and all other Arctic states engage in the Arctic Coast Guard Forum, Russia's domestic investment into search and rescue (SAR) and marine environmental response (MER) capabilities is not commensurate with their increased maritime traffic ambitions. As the Arctic becomes more accessible, it also becomes more treacherous because of greater levels of unpredictability, extreme weather conditions, the tyranny of distance which extends response times, limited capabilities around high-north communications, and the general lack of support infrastructure.

The Northwest Passage (NWP) weaves through Canada's northern islands, with 6 primary routes. Like the Northern Sea Route, cargo traffic through the general NWP is constrained by depth and width of vessels. The NWP is thus not likely to be a highly-utilized commercial transit route. The Arctic Council working group, PAME, reported that ship traffic increased from 112 trips in 2013 to 160 trips in 2019, with the majority of the increase represented by Canadian-flagged bulk carriers.

On the horizon is the potential for a Trans-Polar Route, which would traverse the top of the world once the polar ice cap is sufficiently diminished. However, this is not a route that is likely to be feasible for quite some time.

The Arctic Shipping Corporate Pledge—a voluntary commitment by consumer goods and shipping logistics companies to not send ships through the Arctic due to environmental concerns—may be a harbinger of socio-political constraints for increased Arctic shipping. Though there is criticism of this initiative largely being a platform for greenwashing, the thought behind it — of environmental organizations seeking to preserve the Arctic environment in the face of accelerating climate change and limiting impacts on the marine environment from factors such as ship strikes, noise and light pollution, chemical pollution, and the like— is representative of a growing set of concerns (Middleton, 2019). Finding a balance between environmental integrity and sustainable economic development will be important for Arctic countries as they develop economically.



Mineral Deposits

Minerals, which are abundant in the Arctic, are crucial to the green energy transition and the proliferation of technological devices. The West is seeking to strengthen supply chains and processing capability of rare earth minerals separately from China—who currently dominates mineral supply chains— so as to reduce the potential for these crucial resources to be coercively leveraged as tensions with China increase.

Rare earth minerals are crucial to the green energy transition in products such as wind turbines and electric vehicles as well as technology including cell phones and devices. Six times more minerals are needed for an electric vehicle than for a conventional one, and nine times more minerals are needed for onshore wind plants than gas-fired plants (IEA, 2021). Cooperative efforts on battery recycling, to preserve crucial minerals such as lithium, will be an increasingly important area to advance international cooperation. China currently controls the vast majority of the supply chain for rare earth minerals, which is increasingly problematic as minerals grow in value and relations worsen between the West and an increasingly authoritarian China.

The Arctic, particularly Greenland and Russia, contain significant deposits of strategic minerals. The Russian Ministry of Natural Resources and Environment pivoted its geological prospecting program towards solid mineral deposits over hydrocarbons as an assured source of freight for the Northern Sea Route through 2035. Solid minerals to be prioritized for long-term development include copper, gold, diamonds, and platinum-group metals. Greenland's 2021 election results made it clear that mineral exploration projects will not be acceptable as neo-imperialist endeavors, and that mining projects must balance financial profit with environmental sensitivity and protection. Mineral development has the potential to diversify Greenland's economy as it seeks full independence from the Kingdom of Denmark, though inclusive and culturally appropriate development is key.



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Oil and Gas Deposits

According to the United States Geological Survey, the Arctic contains approximately 13% of the world's undiscovered conventional oil resources and about 30% of its undiscovered conventional natural gas resources (Gaultier, 2008). Hydrocarbon-heavy economies such as Russia, Norway, and the state of Alaska face challenges associated with transitioning to alternative revenue sources as the world shifts towards renewables, as well as risks from stranded assets.

Russia has extensive oil, gas, coal, and mineral deposits in the Arctic and it is seeking to realize their commercial potential and minimize any stranded assets. Russia's lack of economic diversification beyond fossil fuel exports presents a twofold vulnerability: it might lead to economic fragility as key assets prove stranded and/or simultaneously damaged by domestic climate impacts. Thawing permafrost is a major challenge to the integrity of infrastructure in the Russian and Alaska Arctic, including infrastructure which supports the oil and gas industry.

Russia's Yamal LNG facilities are lucrative for world energy markets, particularly the Asia-Pacific region. Russia's Arctic Policy describes "the slow pace of geological exploration" as a primary threat to Russia's national security in the Arctic, underscoring the degree to which they view it as essential to realize the region's economic potential (Russia Maritime Studies Institute, 2020). The GeGaLo Index, which estimates geopolitical winners and losers after a full-scale transition to renewable energy, found Russia to be at particularly high risk for stranded assets, which threatens their economy due to sanctions and the lack of economic diversification beyond fossil fuels (Overland, 2019).



CLIMATE-FRAGILITY RISKS IN THE ARCTIC

The global threat environment will be increasingly shaped by “actorless threats”

Actorless threats, such as climate change, pandemics, and dramatic losses of global biodiversity, are significant emerging factors that shape the global threat environment. These factors are not traditionally included in threat calculus to the same extent that actor-based threats are, but given the magnitude of risks associated with them, their omission would likely have serious consequences for planning and preparation, as well as risk mitigation efforts.

Climate change is one of several emerging actorless threats which require a systems-thinking mentality to avoid being overly reductionist or taking a siloed approach towards risk mitigation. The One Health model put forth by the Centers for Disease Control and Prevention (CDC) in the United States recognizes the interconnected nature of human health with the health of animals, and our shared environment. Such an approach will be necessary for assessing the full spectrum of risks as well as helpful options in the policy realm to mitigate those risks. This perspective is further buttressed by a 2021 report from the Council on Strategic Risks which identified that “ongoing stresses to critical Earth systems, including to water, food, wildlife, forests and fisheries, heightens the risks of future pandemics, conflict, political instability, loss of social cohesion, economic harm, and other security outcomes” (Schoonover et al., 2021).

The risks that these actorless threats produce in the Arctic are significant in Russia. According to the “Climate Security Assessment” produced by the Hague Centre for Strategic Studies, in Russia, the top-level climate security risks are wildfires and riverine flooding, followed by heatwaves. Four Twenty Seven, part of Moody’s ESG Solutions Group, blends economic modeling with climate science and has identified serious risks to Russia in the coming years. One of their models forecasts significant flooding risk to Russia by the year 2040, with other high-risk climate hazards to include water and heat stress, sea level rise, and wildfires. This model predicts that around 70% of Russia’s population and GDP as well as 50% of its agriculture may be exposed to at least one climate hazard in the future. Russia’s Minister of Natural Resources and Ecology, Alexander Kozlov, has stated that Russia’s economy is anticipated to lose more than \$67 billion by 2050 due to permafrost thaw impacts on infrastructure (Kireeva, 2021). Beyond Russia, the U.S. state of Alaska is also 85% underlain by permafrost, and degradation of Alaska’s cryosphere, as well as those in British Columbia and Norway, has led to increased tsunami risk (Woods Hole Research Center, 2020).

Increased military activity in the Arctic may have unintended consequences

Russia is expanding and modernizing its military capabilities, and conducts significant amounts of advanced weapons testing in the Arctic. Their re-militarization of previously abandoned Cold War bases and development of greater operational capabilities are of concern to Russia's neighbors, particularly following Russia's annexation of Crimea in 2014 and their growing aggression towards both the international community and their citizens at home. NATO and partner nations have increased their exercises and are renewing commitment to Arctic operational capability. All of this, if not carefully planned, can lead to security dilemma dynamics becoming more prominent.

The Arctic nations have historically maintained dialogue on military security matters through the Arctic Security Forces Roundtable (ASFR) and the Arctic Chiefs of Defense (CHODs). However, following Russia's annexation of the Crimean peninsula in 2014, those fora were discontinued. The dialogue that had existed through the NATO-Russia Council has also been discontinued, despite an invitation extended by NATO to Russia in 2021 for a meeting to be scheduled. Venues such as the Munich Security Conference, which offers a forum for discussion at its invite-only Arctic Security Roundtable, are increasingly important in the absence of sufficient formal fora for military dialogue. Activities such as an Arctic Ocean Naval Symposium, which would bring together the Chiefs of Arctic Navies to discuss maritime security, could be a positive step towards renewing dialogue and reducing risk at the operational level (Berbrick, 2020). The development of a Code of Conduct for Arctic Forces could also help to reduce risks related to increased military exercises in the region (Goodman, 2021).

Climate change provides an avenue for China to strengthen its Arctic presence

Since its 2018 proclamation of being a "Near Arctic State" (an internationally unrecognized status), and their articulation of a "Polar Silk Road" extension of its Belt and Road Initiative, China has expanded efforts to gain access, presence, and influence in the Arctic region. This has primarily taken the form of extensive soft-power diplomatic efforts, financial investment, and scientific research— which are dual-use and have the potential to be leveraged for both civilian and military purposes.

China justifies its claim of being a "Near Arctic State" by referencing the ways that it will be impacted by changes in the region. By that same logic every country in the world could claim to be a "Near Arctic State," since there is no place on Earth that is immune to the effects of a changing Arctic. This is particularly true for Small Island Developing States which face existential threats from sea level rise. Cooperation on scientific research in the Arctic to understand the extensive changes that are occurring is very important, but any aggressive efforts of challenging the status quo to assert Chinese global leadership— and any coercion to actualize that vision— make cooperation more challenging.

The Danish Intelligence Service thus stated that "China has demonstrated both the capability and willingness to use investments and other kinds of economic instruments as a lever to obtain political objectives" (Auerswald, 2019). The U.S. Department of Defense has also voiced concern about China's interest in the Arctic extending to their potential to establish an assured second-strike capability through a sea-based nuclear deterrent (Stewart, 2019). The revelation that a former Russian Navy officer, Valery Mitko— who was charged with treason for spying for China— had divulged intelligence to China about Russia's methods of submarine detection makes that concern more prominent (Shedov, 2021).



Indigenous cultures and communities are disproportionately at risk

Indigenous communities in the Arctic are on the front lines of climate change. Communities in Alaska, such as Newtok and Shishmaref, face existential threats from a number of climate impacts. Coastal erosion and shrinking ice mean that their coastal communities are increasingly threatened by storm surges. Permafrost thaw threatens existing infrastructure and complicates future infrastructure development for many of these communities who are already lacking critical infrastructure. Salt water intrusion threatens their fresh water resources. In Alaska, these impacts have driven the village of Newtok to begin a relocation process to a new site nine miles away from its present location. This raises complex questions associated with relocation, including who makes decisions and who covers the costs.

Indigenous communities have lived in the Arctic for thousands of years and therefore have extensive histories of adaptability, including through previous, pre-anthropogenic climate change conditions. However, the rate of change associated with anthropogenic climate change is exceptional and unprecedented. The lingering impacts of colonialism have also devastated communities through the forced re-location and systematic abuse of indigenous youth at boarding schools, and assimilation practices that discouraged traditional knowledge, use of Indigenous languages, and participation in culturally meaningful rituals and practices.

Actorless threats add additional layers of risk to the health of Indigenous communities of the Arctic. As one Indigenous elder from the Bering Sea region shared, “[i]n a warming Arctic, access



to our subsistence foods is shrinking and becoming more hazardous to hunt and fish. At the same time, thawing permafrost and more frequent and higher storm surges increasingly threaten our homes, schools, airports, and utilities” (NOAA, 2020). Access to remote communities in regions that are often lacking reliable roads is a complicating factor during times of disruption. During COVID-19, discontinuation of air service to remote Alaskan and Canadian communities, meant as a preventive measure, resulted in the severing of transport links to bring food and medicine to those communities.

Despite tremendous adversity, Indigenous communities are remarkably resilient, and there is a resurgence of effort to reclaim Indigenous heritage, language, and identity, as well as to be more involved in research and development of policy. This matters not just for Indigenous communities but for the rest of the world, as their traditional world views— which tend to demonstrate little to no conceptual separation between humankind and the natural world—are, by the very nature of their being, more conducive to longevity and wise decision-making.

It is important to underline that the Arctic region is not homogenous—there are significant geomorphological and demographic differences between the North American Arctic and the European Arctic, and significant differences within sub-regions. This necessitates place-based, culturally relevant, respectful, and inclusive consultation, policy dialogues, and decisions. The human security threats from climate change must also not be underestimated, as climate change will contribute to public health challenges and exacerbate mental health issues that already plague the region.

Shifting migration patterns are seen as a threat rather than opportunity

Arctic countries in general will see internally shifting demographics as people move away from low-lying coastal areas and lands heavily impacted by permafrost thaw, fire, and increased flooding. Understanding when this movement is a result of forced displacement versus voluntary migration will be important to developing appropriate responses, including recognizing when there are “trapped” populations—people who are at risk if they stay in a location, but lack the resources to move.

There is a high level of uncertainty regarding the future potential for migration to impact Arctic nations. Notable research into the long-perpetuated claim about internal security risks posed by liberal asylum policies, however, found that claim to be unsubstantiated (Kivimäki, 2021). Future migration to the Arctic could in fact be the boon to economic growth that Arctic nations are seeking.

As the Arctic region sees increased potential for expansion of agriculture and the bioeconomy, an expanded workforce will be needed to realize that potential. One challenge shared by Arctic countries is the lack of population to support the economic development they envision. Proactive efforts that provide safe, sanctioned migration pathways and bolster the reception and integration of migrants could help to address this challenge. Shifting the narrative from one of fear of migrants and reassuring communities that the integration of migrants does not come at a cost to their own security (livelihoods and otherwise), will be key.

Inadequate international risk mitigation efforts may increase the likelihood of geoengineering technology deployment on a unilateral basis

Because the Arctic is changing faster than anywhere else on Earth, and there are significant equivalent amounts of sea level rise locked up in land-based ice, it is a region of interest for targeted geoengineering interventions to counter climate change. This increases the risk of a state or non-state actor testing or deploying geoengineering technology, since certain methodologies— such as stratospheric aerosol injection— are low tech and relatively inexpensive (Smith, 2018). There is also a risk of unilateral geoengineering technology deployment if climate fragility risks are not adequately mitigated.

As of 2017, over 50 countries had operational weather modification programs (Munoz, 2017). In 2021, a Harvard project called the Stratospheric Controlled Perturbation Experiment (SCoPEX) attempted to launch a high altitude balloon from the Esrange Space Station in Northern Sweden to assess the viability of it to host stratospheric aerosol equipment in the future. This balloon launch was cancelled following public pushback from Swedish NGOs and the Saami Council, which represents the indigenous Saami people whose traditional territory of Sapmi spans the Arctic from Northwest Russia to Finland, Sweden, and Norway. The Saami Council wrote an open letter stating a “rejection” of the plans for R&D testing due to potential for “catastrophic consequences” of the technology they seek to develop, and the lack of consultation with Northern Swedish communities, among other grievances. This offers a glimpse of the complex moral, ethical, and legal aspects of geoengineering research, which could be disregarded by an emboldened unilateral actor.

Increasing economic activity in the Arctic may fuel criminal opportunism

As the Arctic experiences unprecedented levels of change, it is likely to be targeted by opportunistic criminal networks, which should be taken into consideration by policymakers seeking to further sustainable development of the region.

Special economic areas such as free trade zones and ports have been considered as tools to facilitate commerce in and through the Arctic region. Indeed, in December 2019, the first free trade port in the Arctic was established in Murmansk, Russia. While free trade zones are useful tools for reducing barriers to trade, their decreased levels of oversight can make them vulnerable to illicit trade and financial crimes, such as trade-based money laundering (Moiseienko, 2020). The Arctic policy community should look to best practices from elsewhere in the world to mitigate the risks of criminal opportunism as the region develops.



Pandemic



Global climate change

are examples of



Actorless threats

contribute to

contributes to

- Sea level rise
- Rainfall changes in the Sahel
- Droughts in Central Europe

contribute to



Public health threats



Wildfires



Floods



Heatwaves

Climate impacts in the Arctic

affect

increase interest in

Permafrost thaw

risk increasing



Melting ice sheets



Storm surges



Coastal erosion



Indigenous communities



Geoengineering experiments



Militarization



Geopolitical instability



Collapse of AMOC

affect



Migration patterns

increase

THE ARCTIC

Economic activity in the Arctic



Criminal networks

leverage



Oil & gas



Minerals



Shipping



Green energy transition

impact



ENTRY POINTS TO REDUCE CLIMATE-FRAGILITY RISKS

The changes in the Arctic are not confined to the Arctic. To the contrary, they are of immense consequence to international security and stability because of the risks associated with environmental changes, the risks to human and civil security, and the resulting geopolitical risks.

Based on the analysis in this risk brief, the compound climate and fragility risks would be best addressed by governments and policy makers prioritizing the following:

➔ **Cut emissions:**

The most important task the international community faces in the near term is to catalyze emissions reduction efforts and increase carbon sequestration, primarily through nature-based solutions and in line with the precautionary principle.

➔ **Strengthen the circular economy:**

Keeping materials in the value chain creates more value and reduces impacts of virgin production, in mining, plastics, and beyond. The recovery of rare-earths from electronic waste products, for instance, should be increased so as to extend their lifespan and reduce environmental impacts of mining that will otherwise be necessary to meet rising demand.

➔ **Deepen dialogues:**

Encourage the development of a mechanism for increased mil-to-mil communication among Arctic states and other significant security actors through dialogue. The Arctic Security Roundtable at Munich Security Conference could serve as such a mechanism, as could other cooperative, peacetime military engagements, such as the prospect of an Arctic Ocean Naval Symposium.

➔ **Fill governance gaps:**

Explore gaps in governance structures resulting from regional change, such as the opening of the Central Arctic Ocean, and the entry into force of international agreements such as those on fisheries and biodiversity.

➔ **Increase emergency response capabilities:**

Arctic nations should deepen cooperation between the Arctic Coast Guard Forum (ACGF) and entities such as the Emergency Prevention, Preparedness and Response (EPPR) Working Group of the Arctic Council to more rigorously develop coordinated response capabilities. Specifically, the ACGF and EPPR should conduct the joint search and rescue (SAR) and marine environmental response (MER) exercise which was planned as an in-water exercise for 2021 but shifted to an online format due to COVID-19.

➔ **Cooperate in science:**

Greater international cooperation is needed around scientific research, including better atmospheric monitoring to capture methane hydrate release from subsea permafrost thaw, better data sharing between industry, government and researchers, year-round data collection, more robust international terrestrial and maritime Arctic observing networks, and building the capability of ocean forecasting – similar to what currently exists for weather.

➔ **Ensure indigenous involvement:**

Traditional knowledge holders should be consensually integrated into research and policy development as a complement to science-based decision-making, in order to learn from their embodied knowledge and generate solutions based on longer-term thinking.

➔ **Uphold integrity:**

Incorporate expert advice on anti-corruption and transparency for policies relating to sustainable development, so as to preserve development benefits for the legitimate economy.

➔ **Support localized solutions:**

Identify climate risk reduction potential in partnership with Arctic communities, recognizing that the Arctic is not homogenous and that solutions will likely differ across the region. Community voices should be amplified and empowered.

➔ **Allow for flexible policies:**

Because of the higher levels of unpredictability associated with the acceleration of climate change, policies should be developed to reinforce adaptability wherever possible, rather than fixed and hence at risk of being ineffective or even counterproductive.



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