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On The Cover

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"OP NUNALIVUT"
A CC-138 Twin Otter aircraft from 440 Transport Squadron sits parked on the ice next to the Combined Dive Team camp site in Gascoyne Inlet, Nunavut, during Operation NUNALIVUT 2012.
Photo: Sgt Matthew McGregor

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Abstract

Canada's North is warming far faster than the global average, and the resulting coastal erosion, flooding, permafrost thaw, and wildfires are outpacing the civilian systems meant to manage them. Federal response has increasingly defaulted to the Canadian Armed Forces (CAF): Operation LENTUS activations have broadly doubled every five years since 2010, and the CAF has shifted from last resort to routine backstop. This dependency is a defence and security problem, not only an emergency management one: repeated military substitution imposes readiness and opportunity costs while suppressing the local capacity that most determines disaster outcomes. Drawing on disaster research, parliamentary and departmental evidence, Nordic total defence practice, and Canadian Arctic policy sources, this paper treats community-level resilience as a strategic asset: in the Arctic, everyday presence sustains jurisdiction more durably than episodic demonstrations of force. It assesses the hazard landscape, the limits of the current approach, the contribution of social capital and Indigenous leadership, and available science and technology enablers, then adapts Nordic total defence lessons to Canadian geography, federalism, and reconciliation commitments. It sets out seven five-year recommendations: strengthen hazard monitoring and adaptive infrastructure; rebalance the CAF's role through a whole-of-community surge mechanism; invest in Indigenous-led resilience hubs and governance; strengthen social capital and volunteer networks; expand community access to locally usable science and technology, with improved connectivity and digital literacy; improve coordination through a northern-focused governance mechanism informed by Nordic practices; and sustain sovereignty by investing in housing, services, and stable population presence.

Acronyms and Abbreviations

AI — Artificial intelligence
CAF — Canadian Armed Forces
COP — Common operating picture
DND — Department of National Defence
NBI — Natural (and nature-based) infrastructure
NGO — Non-governmental organization
NWT — Northwest Territories
Op LENTUS — Operation LENTUS (CAF domestic disaster-response operation)
RFA — Request for Federal Assistance
SE — Synthetic environment
SMR — Small modular reactor

Introduction

Canada's North is warming much faster than the global average, accelerating sea-ice loss, permafrost thaw, and coastal erosion that threaten communities and critical infrastructure.[1] These climate-driven hazards intersect with social and governance factors to produce disproportionate impacts, underscoring that disasters are shaped by vulnerability and capacity rather than by hazards alone.[2] The policy challenge is immediate. As hazards grow more frequent and severe, domestic disaster response has increasingly relied on the CAF, shifting the military from last resort to default backstop and creating readiness and opportunity-cost concerns for defence and security policy.[3]

The existing approach manages the symptoms of thin civilian surge capacity rather than its causes. Military substitution delivers short-term results, but it does not build the provincial, territorial, and community capabilities that determine how severe a disaster becomes, and community resilience is not consistently framed as a strategic capability in national policy. In the Arctic, that gap carries a further cost: the same conditions that drive emergency demand also erode the population base and local governance on which Canadian jurisdiction rests.

This paper argues that community-level resilience is a strategic asset for Canadian sovereignty, particularly in the Arctic, where everyday presence sustains jurisdiction more durably than episodic demonstrations of force.[4] It evaluates the hazard landscape, examines the risks of military over-reliance, and highlights how social capital and Indigenous leadership can strengthen preparedness. It then identifies science and technology enablers and adapts lessons from Nordic total defence models to Canada's geography and governance, with attention to reconciliation and co-development with Indigenous partners.[5]

The paper proceeds in six analytical parts: the climate-driven hazard landscape (Section I); the limits of the current approach (Section II); community resilience and social capital (Section III); science and technology enablers (Section IV); a Canadian adaptation of total defence (Section V); and sovereignty by presence (Section VI). The analysis is synthesized in a comparative table of threats, vulnerabilities, and mitigation pathways (Annex A) and translated into seven five-year recommendations that prioritize civilian surge capacity, Indigenous-led resilience hubs, nature-based and adaptive infrastructure, and governance mechanisms that align community readiness with national security objectives.

I. The Policy Problem: Climate-Driven Hazards in Canada's North

The Arctic is warming significantly faster than the global average due to human-induced climate change and natural variability. This "arctic amplification" effect is causing a decrease in sea ice and increased open-water conditions, resulting in greater wave action and elevated coastal erosion and flood risk.[6] The Arctic Ocean could be seasonally ice-free as early as the 2030s,[7] with associated storm surges up to three times higher than recent historical levels.[8] Many Canadian Arctic communities are already experiencing significant impacts from coastal flooding and erosion, which are expected to become more frequent and severe in response to sea-level rise. Military infrastructure may also be susceptible to storm surges, coastal erosion, and flooding, putting operational readiness at risk.

Arctic amplification also causes the degradation of permafrost: that is, the melting of ground that had been permanently frozen for at least two years. This can cause landslides, coastal slumping, infrastructure collapse, and the potential release of pathogens and contaminants from the soil.[9] Permafrost degradation also threatens Arctic communities by disrupting homes, transportation, and cultural practices — and can even force entire communities to relocate. It similarly puts military infrastructure and operational readiness at risk. These processes reinforce one another: permafrost emissions accelerate regional warming and sea-ice loss, which in turn hasten further thaw. Thawing permafrost and changes in atmospheric and oceanic heat transports also contribute to rapid polar warming.

Wildfire frequency and extent are increasing at an unprecedented rate due to climate change effects.[10] In the North, lightning is the primary trigger of wildfires and climate change is driving more lightning strikes. Drier conditions are accelerating rates of spread. Recent years have seen devastating wildfire seasons in the Northwest Territories (NWT) and Yukon, less so in Nunavut due to the prevalence of tundra. The 2023 season was the most destructive in Canadian history, with the northern territories particularly affected.[11] Public concern is growing as affected communities face an increasing threat of evacuation, as seen during the 2023 evacuation of Yellowknife. Indigenous communities are disproportionately impacted by wildfire evacuations.[12] Additionally, wildfire smoke from southern fires can travel north, degrading air quality and posing particular health risks to vulnerable populations in northern communities.[13]

These hazards are not new in kind, but their frequency, scale, and simultaneity increasingly exceed the civilian capacity available to manage them. That gap explains the pattern examined in the next section: the steady substitution of military capacity for civilian capacity in domestic emergencies.

II. Assessing the Existing Approach: Over-Reliance on the CAF for Civil Emergencies

Over the past decade, the CAF has evolved from a "last resort" to a routine instrument for domestic disaster response, revealing structural gaps in Canada's emergency management system. Operation LENTUS (Op LENTUS) is the CAF's established operation for the provision of aid to civil authorities in response to domestic emergencies, including natural disasters and other significant events that exceed provincial or territorial response capacity. Department of National Defence (DND) reporting shows that Op LENTUS activations have "broadly doubled every five years since 2010",[14] with an average of two per year from 2010 to 2016, nearly four from 2017 to 2021, and eight requests in 2023 alone.[15] The pandemic also generated sustained, atypical demand: between January 2020 and August 2023, the Government Operations Centre received more than 230 Requests for Federal Assistance (RFAs), 157 of which involved the CAF, including 118 pandemic-related missions.[16]

From a disaster-sociology perspective, this pattern signals institutional path dependence: when civilian surge capacity is thin, militaries become the default all-purpose fixer, even when the skill match is imperfect. Recent research on CAF flood operations finds that while soldiers can and do perform well, frequent redeployment into humanitarian roles imposes competency cross-over challenges and risks crowding out core defence training.[17] DND's own strategic analysis echoes the opportunity-cost problem: domestic disaster taskings wear down fleets, interrupt training cycles, and lower availability for allied and expeditionary commitments.[18]

Readiness implications are organizational and human, not merely technical. Parliamentary evidence underscores that high domestic tempo disrupts force generation, strains families, and reduces preparedness for other missions.[19] Analysts likewise warn that Canada lacks a civilian analogue to Op LENTUS and that provincial and territorial readiness remains uneven, leaving the CAF to backstop gaps in planning and coordination.[20] Climate change amplifies this reliance by increasing the scale and duration of hazard cascades, especially in the North, where sparse infrastructure and distance magnify logistics burdens.[21]

Canada is normalizing "exceptional" solutions: repeated military substitution for civilian functions can suppress the emergence and professionalization of local capacities that research shows are decisive in disaster outcomes. The policy problem is therefore not the CAF's competence, but the system's dependency. A prudent course is to recentre civilian surge by investing in interoperable provincial and municipal capabilities and community-based assets, while recalibrating federal doctrine so that the CAF resumes a genuinely last-resort role. Targeted investment in civilian response infrastructure would not only strengthen local readiness but also prove fiscally prudent, given the established evidence that every dollar spent on preparedness yields several-fold savings in avoided response costs, often cited as a 1:4 ratio.[22] That shift would preserve the short-term lifesaving gains the military delivers, without eroding long-term readiness and social resilience.[23]

III. Community Resilience through Social Capital

Community resilience is the capacity to anticipate, absorb, adapt, accommodate, and recover from hazards while sustaining core functions.[24] In Canada's North, where climate change amplifies disasters such as wildfires and floods, and slow-onset trends such as permafrost thaw and coastal erosion, resilience is a proactive foundation for sustaining livelihoods, cultures, and governance. Social capital — the bonding, bridging, and linking networks that enable collective action — is essential to preparedness.[25] Bonding networks are the close ties within a community, bridging networks connect one community or group to another, and linking networks connect communities to governments and institutions. In remote and Indigenous Arctic and sub-Arctic communities, social capital manifests through traditional knowledge, communal decision-making, and intergenerational support, all of which are vital for climate-driven hazard preparedness.

As mentioned, the North experiences warming up to four times the global average,[26] threatening infrastructure, food security, and cultural practices.[27] In isolated areas with delayed formal services, internal strengths prevail over external aid. Social capital fosters trust and reciprocity, enabling resource-sharing, rapid information flow, and volunteer mobilization.[28] Indigenous contexts amplify this via place-based knowledge; Inuit Qaujimajatuqangit, the traditional local geographical and Inuit epistemology that offers insight gained only through experience and presence on the land, provides holistic environmental insights for predicting and responding to changes.[29] Indigenous leadership anchors monitoring programs that track sea ice and wildlife, integrating traditional knowledge with scientific observation to enhance early warnings.[30] Studies show that social cohesion, rooted in cultural practices such as sharing and storytelling, builds adaptive capacity through collective problem-solving.[31]

The evidence bears this out. During the 2017 British Columbia wildfires, bonding social capital in Tsilhqot'in Nation enabled shelter and food provision, reducing external dependency.[32] In Nunavut's 2021 Iqaluit blizzard, bridging capital facilitated supply coordination.[33] Social networks promote knowledge sharing and emotional support, mitigating psychological impacts.[34] However, historical traumas such as residential schools erode social capital: reduced institutional trust weakens the linking ties between governments and citizens, disrupting local governance.[35]

Social capital also intersects with health. Bonding ties correlate with better mental health, buffering environmental stress.[36] In Yukon, elder-led programs foster intergenerational ties, preparing youth for adaptation while preserving identity. This knowledge transfer equips youth to carry their culture into a modern, technologically enabled society. Economically, networks support alternative livelihoods amid disrupted subsistence activities, via cooperatives that share equipment such as snowmobiles and provide logistical- and heavy-construction support.[37] Inequities persist in isolated communities with weak bridging capital and limited funding access; policy must empower Indigenous co-management of disaster preparedness, and thus the design of response operations, so that Indigenous priorities shape how government conducts emergency management.[38] Partnerships such as British Columbia's First Nations Emergency Services Society integrate Indigenous leadership into disaster-response frameworks.[39]

Ultimately, social capital multiplies resilience, converting vulnerabilities into strengths. Investing in social networks and Indigenous initiatives reduces reliance on the CAF and builds self-sufficient preparedness against escalating threats. This underscores why community resilience must be treated as a strategic asset.

IV. Science and Technology Enablers for Civil Preparedness

Social capital and Indigenous leadership are the foundation of local preparedness, but communities also need practical tools to anticipate, monitor, and reduce hazards. For the flooding and erosion hazards described in Section I, adaptation takes three main forms – "retreat" (relocating infrastructure and communities), "avoid" (staying away from areas of high hazard risk), and "protect" (building defences) – all supplemented by a fourth function: "monitoring", which alerts communities and stakeholders to emerging threats. This section sets out the science and technology options, organized around the four adaptation functions of northern hazard management: monitoring and remote sensing, coastal protection, permafrost stabilization, energy resilience, and wildfire detection and response.

Certain functions can be supplied by remote sensing, such as monitoring ice roads or permafrost degradation near infrastructure.[40] For local communities to assess climate impacts effectively, however, they require software tools that translate remote sensing data into actionable information, along with persistent wireless connectivity.

An attractive technology for the "protect" function is nature-based infrastructure (NBI), which uses natural or hybrid features (for example, beaches, wetlands, reefs, islands, and headlands) for coastal flood and erosion management. Compared to conventional "hard" protection such as seawalls, NBI can be less costly, more adaptable to changing conditions, and able to provide social co-benefits by integrating communities into the design process.[41] NBI has been applied globally for coastal protection and is now being used to safeguard U.S. military installations.[42]

On the North Norfolk coast in the United Kingdom, a high risk of saline flooding to farmland has been managed through a suite of measures, including NBI centred on dune restoration; this created a large area of intertidal habitat, protected and enhanced freshwater habitat, and mitigated flooding risk. In Long Beach Island, New Jersey, berm and dune systems have been built to reduce storm damage to infrastructure. The coast around MacDill Air Force Base in Florida was stabilized with a nearshore oyster reef system and vegetative plantings that also supported the later establishment of salt marsh and mangrove habitat.[43] Further research is required into Arctic applications of NBI, where it would be especially practical because it can employ locally available natural materials, while hard infrastructure remains logistically and financially prohibitive due to remoteness and climate.

Permafrost degradation is an ongoing concern in Arctic regions. Two options can help slow that degradation and protect the infrastructure built on frozen ground: thermosyphons and peat. Thermosyphons are sealed devices that draw heat out of the ground during winter, helping to keep the soil beneath foundations frozen, and they generally require no energy input to operate.[44] Peat, the spongy, organic material made of partially decomposed plant matter that accumulates in waterlogged, oxygen-poor peatlands, has thermal properties that make it an effective natural insulator. Used together, they offer a practical, locally available means to slow permafrost thaw and protect infrastructure such as buildings, pipelines, and bridges.[45]

Sustainable energy is also central to community resilience. Most communities depend on diesel-generating stations, with fuel sealifted to large storage tanks. While reliable, this system carries high costs, logistical burdens, and environmental impacts. Incorporating renewable sources such as wind and solar in the local energy mix could enable Arctic "microgrids," small, self-contained electricity networks serving a single community, to reduce reliance on diesel, cut emissions, and strengthen energy security against supply chain disruptions.[46] This would need to be supported by advanced battery storage and efficient variable-speed generators.[47]

A small modular reactor (SMR) is a next-generation nuclear reactor that is smaller, cheaper, and more flexible than traditional designs. Built in factories as modules for easier transport and assembly, SMRs can provide clean power for remote areas with enhanced safety and scalability and are being explored in Canada and internationally.[48]

The different energy technologies and the NBI technology described above can benefit both civilian communities and military installations. Investing in dual-use capabilities, those that enhance both community resilience and CAF readiness, enables shared costs, accelerates innovation, and reduces the need for recurrent military substitution in civil response.

Wildfires pose one of the most destructive natural hazards, due to their economic costs and wide-ranging impacts on air quality, human health, and the displacement of communities. Addressing them requires subject matter expertise and investments across different levels of government. The establishment of the Centre of Excellence for Wildland Fire Innovation and Resilience by the Government of Canada is an important step.[49] With wildfire frequency and intensity expected to increase, more resources must be directed toward prevention and suppression. The 2029 launch of the WildFireSat mission, a dedicated satellite for wildfire detection, will improve monitoring.[50] Other early detection technologies, such as networked ground sensors, can further enhance capabilities.[51]

On the response side, wildfire operations merit more systematic analysis to optimize suppression. Operations research, widely used in military contexts, can also strengthen wildfire management[52] through tools such as common operating pictures and synthetic environments. A common operating picture (COP) is a shared, real-time view of an incident that integrates data from multiple sources (for example maps, text, and video) into a single display, so that everyone involved, from commanders to frontline responders, works from the same understanding. Because wildfire frequency and intensity are expected to rise in the coming decades,[53] COPs will help direct scarce suppression resources where they are most needed.

A synthetic environment (SE), also called a "digital twin," is a high-fidelity, computergenerated simulation of a real or imagined scenario, using technologies such as AI, extended reality, and gaming engines for training, analysis, and development. In the wildfire-suppression context, SEs could support the training of incident commanders and tactical decision makers, the post-hoc analysis of suppression operations, and the testing of new technologies, such as decision-aid tools, or of new procedures and tactics.

COPs and SEs represent another dual-use opportunity. Drone technology may also accelerate detection-to-suppression time-lines, especially for community-level response.[54]

At the community level, Canada's FireSmart program[55] – a national, community-based initiative – provides resources and education, especially to First Nations, for reducing wildfire risk through different disciplines such as vegetation management and emergency planning. It makes prevention a shared responsibility of homeowners, communities, and governments.

High-resolution, community-level wildfire risk assessments can further inform the design of mitigation measures such as firebreaks, which are cleared strips of land where flammable vegetation has been removed so as to act as a barrier against wildfires by depriving them of fuel and providing firefighters with safe access.[56]

These enablers are not self-executing. Realizing their value depends on governance arrangements that connect national scientific capabilities to community-level use, which is the problem the following section addresses.

V. Options and Pathways: Toward a Canadian "Total Defence" Model

Total defence is a Nordic-originated security strategy integrating military and civilian preparedness to achieve a whole-of-society response to all forms of crises and threats, spanning wars, natural disasters, and hybrid threats.[57] In Sweden, Finland, and Norway, implementation rests on preparing all functions of society, including government, businesses, and individuals, are prepared to contribute to national security. Societal involvement is facilitated through public education, mandatory continuity planning, and strong voluntary organizations, including structured civil defence and reserve organizations that train civilians to support logistics, emergency response, infrastructure protection, and continuity of essential services. Finland's comprehensive security model achieves high participation through formalized cooperation among government, industry, municipalities, and citizens, supported by regular preparedness exercises and clearly assigned roles across sectors.[58] Norway and Sweden reinforce participation through mandated business continuity planning, legal obligations for preparedness in critical sectors, and sustained public awareness initiatives that clarify responsibilities during crises.[59] Collectively, these measures strengthen deterrence by signaling societal resilience and enhance adaptability in regions exposed to persistent security and climate-related stressors.

The discussion below distinguishes between Nordic total defence practices that already exist, Canadian capabilities and institutions that are partially in place, and additional governance, coordination, and capacity-building measures proposed to adapt the model to Canada's context. Adaptation must reflect Canada's geography, demographics, and Arctic challenges, with a focus on strengthening community capacity, Indigenous leadership, and science-based planning, where climate change increases the frequency, scale, and complexity of disasters that strain civilian institutions and drive demand for military support.[60] Whereas Nordic total defence has historically centred on state-based and hybrid threats alongside civil defence, Canada's security environment is characterized by vast geography, dispersed and remote communities, and disproportionate exposure to climate-driven disasters, particularly in the North. These conditions make civilian surge capacity harder to sustain and place Indigenous communities on the front lines of both climate impacts and emergency response, requiring a model that explicitly integrates reconciliation and Indigenous self-determination into preparedness and response. In Canada, the Arctic and Northern Policy Framework already signals this direction through its emphasis on partnership-based approaches to safety and security, grounded in collaboration with Indigenous governments and organizations.[61] This paper proposes building on that foundation: extending the total defence concept into a pan-Canadian framework would reduce over-reliance on the CAF by systematically strengthening civilian and community-based capacities for preparedness, response, and recovery. At the core of this shift is a whole-of-society approach that positions communities as capable first responders rather than passive recipients of federal assistance. Military training and preparedness activities should therefore integrate Indigenous knowledge with modern tools, technologies, and planning frameworks. The Canadian Rangers illustrate how reservists with a permanent presence in remote regions, deep knowledge of local terrain, and trusted community relationships are well positioned to contribute to sovereignty and emergency response.[62] Ranger-like civilian teams, distributed across Canada and trained in hazard mapping, monitoring, and initial response, could complement this model by drawing on Nordic voluntary defence concepts, which rely on structured civilian participation, standardized training, and clear integration with government emergency management authorities. Unlike the Rangers, whose mandate and capacity are constrained by military structure and availability, such civilian teams could provide scalable, non-military surge capacity tailored to regional risk profiles.

Indigenous leadership in emergency management and resilience is not only a normative principle but an operational necessity: grounding preparedness and response in Indigenous self-determination, established governance institutions, and community decision-making authority makes them accepted and effective in communities where externally imposed approaches have historically undermined trust and outcomes.[63] Policy co-development mechanisms, such as the Inuit-Crown Partnership Committee, demonstrate how federal action can be aligned with Inuit-identified priorities through joint decision-making on community safety, climate adaptation, infrastructure resilience, and emergency management.[64] Rather than creating new institutional structures, governments should partner with Indigenous governments, development corporations, and national and regional Indigenous organizations – which are well positioned to co-develop governance frameworks, standards, and tools supporting science-based early warning, preparedness, and response adaptable by communities to their own needs. This approach is premised on supporting communities that choose to remain and thrive on their own terms, not on replicating past state-led efforts to use settlement patterns as instruments of sovereignty or security. These efforts can be supported by integrating remote sensing with participatory mapping of locally relevant hazards, critical infrastructure, travel routes, and culturally significant sites, enabling timely, trusted, and actionable information sharing.[65]

Science and technology can enable the adaptation of Nordic total defence practices in Canada by strengthening situational awareness and decision support at the community level. In Nordic countries, civil preparedness increasingly relies on open and shared data, including satellite observations, environmental monitoring, and risk modelling, to support early warning and coordinated response across civilian authorities and communities.[66] Comparable tools already exist in Canada, such as satellite-based monitoring of permafrost, sea ice, flooding, and wildfire risk, and emerging AI-enabled risk assessment and forecasting. These tools could be better integrated with Indigenous observations of environmental change, travel conditions, and local hazards to improve the relevance and trustworthiness of risk information. Operationalizing this approach requires community digital literacy and training programs so residents can interpret and use these tools for preparedness and early response – potentially reducing response times, improving coordination, and lowering the downstream costs of emergency operations.

Funding and coordination challenges centre on sustained resourcing of community-level preparedness, integration of scientific monitoring into emergency management decision-making, and alignment of federal, territorial, and local responsibilities in northern contexts. Comparative models, such as Sweden's Civil Contingencies Agency, illustrate how a national civil preparedness authority can coordinate risk assessment, preparedness planning, and capacity-building across levels of government while supporting local implementation rather than replacing it – including through centralized guidance, shared risk frameworks, and dedicated funding streams that enable municipalities and regional actors to strengthen preparedness within a common national structure. While Canada's constitutional context differs, such models highlight options for a federal–territorial coordination mechanism that enables northern and remote communities rather than directing response. Targeted pilots, such as those undertaken in erosion-prone Tuktoyaktuk, could test how infrastructure investment, local governance capacity, and community networks can be combined to improve preparedness and adaptation, linking physical protection with social and institutional resilience.[67]

Adapting the total defence model to Canada means enabling communities to remain safe, connected, and resilient in the face of climate change and other stressors, with the co-benefit of sustaining governance presence and reinforcing Arctic sovereignty. Reliable emergency communications, particularly wireless connectivity beyond community centres, are essential: they ensure that civil responders can operate effectively across the vast and remote Arctic regions.

VI. Sovereignty by Presence

In Canada's North, sovereignty is secured less by episodic military demonstrations than by the everyday practices of residents whose lives, labour, and governance embody state authority. This analysis recommends "sovereignty by presence" as a strategy: thriving northern communities are among the most durable expressions of Canadian jurisdiction. The Arctic is a homeland, not merely a glacis for southern Canada, and therefore requires sustained attention and resources for northerners.[68] At the same time, this framing must be approached with caution. Past efforts to pursue sovereignty through presence have included harmful state policies, including coercive relocations and other interventions that treated settlement patterns as instruments of sovereignty rather than expressions of community choice and rights. The approach advanced here is different: it focuses on improving living conditions and supporting Indigenous and northern self-determination so that communities can choose to remain, govern, and thrive on their own terms.

This presence is under strain. Permafrost thaw, coastal erosion, and shifting ice regimes are producing more frequent and severe damage to land, housing, transport nodes, and runways across the Arctic.[69] These pressures are not only environmental but political: failing infrastructure and unreliable services contribute to out-migration, thinning the population base that underpins effective occupation and governance. Analysts therefore argue that reducing domestic vulnerabilities, particularly those that undermine the health, safety, and sustainability of Arctic communities, is one of the most effective long-term defences against foreign interference, coercion, and criminal activity in the North.[70]

Community resilience is thus a strategic asset – even if national policy rarely frames it as such –because it sustains population presence and local governance under climate stress and service constraints. Territorial risk assessments define community resilience as the capacity to anticipate risk, limit impacts, and recover rapidly, grounded in local knowledge, social networks, governance capacity, and Indigenous leadership.[71] In practice, this resilience is expressed through land-based skills and cultural continuity that enable people to travel safely on land and ice amid increasingly unpredictable conditions, sustain subsistence and harvesting practices that support mobility and food security during disruptions,[72] and mobilize trusted social networks and local knowledge to support preparedness and response.[73] These capabilities, reinforced by self-determination, strengthen emergency management by improving situational awareness, enabling earlier local response, and sustaining collective organization during protracted events.[74] A population that can remain in place and adapt to change strengthens sovereignty more durably than one reliant on recurrent external surge capacity.[75] Yet Canada's Arctic continues to face structural barriers to long-term residence, driven by gaps in housing, services, infrastructure, and employment. Addressing these challenges requires predictable support for Indigenous- and northern-led development,[76] delivered through long-term, coordinated federal and territorial action in partnership with Indigenous governments and institutions.

Finally, over-reliance on military backfill for civil shortfalls is neither sustainable nor sovereignty-enhancing. Search-and-rescue capacity remains heavily volunteer-dependent, increasing pressure on the CAF to fill local gaps rather than deter external threats, while allied strategies emphasize engagement with Arctic Indigenous communities and hardening critical infrastructure to climate stressors.[77] Sovereignty by presence therefore demands investments that make communities viable, including safe housing on stable ground, dependable services, equitable health and education, Indigenous self-government, and enhanced local hazard readiness, so that people can remain, adapt, and flourish in the Arctic over generations.

The threats, vulnerabilities, and mitigation pathways identified across Sections I to VI are summarized in Annex A. The recommendations that follow translate that synthesis into practical priorities.

VII. Recommendations: A Five-Year Agenda

The following five-year recommendations build directly on the threats, vulnerabilities, and mitigation pathways identified in Annex A, translating analysis into actionable priorities for Canadian defence and security policy.

1. *Strengthen hazard monitoring and adaptive infrastructure in the North.*

   Invest in remote sensing, permafrost surveillance, and community-based hazard mapping, combined with nature-based infrastructure such as peat insulation, wetlands, and hybrid coastal defences. These measures can mitigate climate-driven risks while reducing dependence on costly hard infrastructure.

2. *Rebalance the role of the Canadian Armed Forces in disaster response.*

   Strengthen a whole-of-community surge mechanism that leverages provincial, territorial, municipal, NGO, and private-sector capacities, ensuring interoperability across jurisdictions. In this model, the CAF serves as a genuine last-resort option rather than the default responder. Such an approach reduces strain on military readiness while cultivating organic, cross-sectoral capabilities that empower local authorities and communities.

3. *Invest in Indigenous-led resilience and governance.*

   Support the creation of resilience hubs co-developed with Indigenous communities. These hubs can integrate traditional knowledge with science and technology, coordinate preparedness and early warning, and strengthen recovery efforts while respecting self-determination.

4. *Enhance social capital and community networks.*

   Fund programs that strengthen bonding, bridging, and linking networks in northern communities. Initiatives such as youth–elder knowledge transmission, volunteer coordination, and land-based skills training can reduce dependency on external assistance during crises.

5. *Expand science and technology enablers for local use.*

   Provide open-source tools such as satellite monitoring, artificial intelligence risk assessments, and participatory mapping, while improving digital literacy and connectivity in remote regions. Combining Indigenous observations with new technologies will improve decision-making and reduce response times.

6. *Improve governance, coordination, and response mechanisms.*

   Assess the feasibility of a northern-focused federal and territorial mechanism that draws on Nordic models such as Sweden's Civil Defence and Resilience Agency or Germany's Federal Agency for Technical Relief. Pilot projects in erosion-prone communities such as Tuktoyaktuk could test governance and technical approaches.

7. *Support sovereignty by sustaining viable northern communities.*

   Prioritize investments in safe housing, stable infrastructure, equitable services, and Indigenous self-government to prevent out-migration. A strong and durable population base provides the most sustainable guarantor of Canadian sovereignty in the Arctic.

Collectively, these recommendations emphasize that resilience is not a narrow emergency management issue but a core element of Canadian defence and security. By strengthening community capacity, rebalancing the role of the CAF, and investing in Indigenous-led governance and adaptive infrastructure, Canada can reduce vulnerability to climate-driven hazards while reinforcing sovereignty in the North.

VIII. Conclusion

Climate change is amplifying northern hazards, but it is the interaction with vulnerability, governance, and capacity that turns hazards into disasters and strategic risk.[78] Canada's growing dependence on the CAF for civil emergencies is neither sustainable nor sovereignty-enhancing, since repeated substitution suppresses local capacity and imposes defence readiness costs.[79] The central insight of this paper is that community resilience is a national security capability. Developing a dedicated federal civilian surge mechanism, alongside Indigenous leadership, strengthened social capital, adaptive and nature-based infrastructure, and locally usable science and technology, can reduce external demands and anchor sovereignty by presence in the

Arctic.[80] Implementing the five-year recommendations aligns civil preparedness with defence objectives, reframing resilience as readiness for a climate-changed North.

Annex A. Threats, Vulnerabilities, and Mitigation Pathways

This annex synthesizes the analysis in Sections I to VI by mapping the central threats, vulnerabilities, and mitigation options into a comparative framework that underpins the recommendations.

Threats	Vulnerabilities	Mitigation
Climate-driven hazards (flooding, coastal erosion, permafrost thaw, wildfires)	Arctic amplification; fragile infrastructure; remoteness and high logistics costs; limited local emergency capacity	Hazard monitoring (remote sensing, permafrost/ice surveillance, ground wildfire sensors); community-based wildfire risk assessments and mitigation plans; local response capability development; nature-based infrastructure (e.g., peat insulation, wetlands); thermosyphons; sustainable energy transition
Over-reliance on Canadian Armed Forces for civil emergencies	Thin civilian surge capacity; uneven provincial/territorial readiness; CAF opportunity costs (training disruption, fleet wear)	Invest in interoperable civilian capacity and "dual-use" technologies; institutionalize wildfire operational research; enhance provincial/municipal readiness; develop civilian-led surge teams; expand DND/CAF support for community resilience as a long-term cost-saving measure; preserve CAF as last resort
Erosion of community resilience and social capital	Historical traumas (residential schools, governance disruptions, forcible relocations); isolation; uneven access to funding	Strengthen bonding, bridging, linking networks; support Indigenous-led initiatives; integrate Indigenous knowledge into disaster planning; empower First Nations emergency services
Gaps in science and technology enablers	Limited digital literacy and connectivity; underuse of local knowledge; dependence on southern expertise	Expand remote sensing and participatory data collection by Arctic (Inuit) community members; use mapping to inform locally relevant solutions; invest in digital literacy programs; blend Indigenous knowledge with AI and satellite tools
Coordination and governance gaps	Fragmented federal–territorial–provincial planning; unclear civilian–military division of labour	Draw lessons from Nordic total defence; co-develop Indigenous-led resilience hubs; explore federal/territorial mechanisms for northern nodes; increase flexibility of DND funding to support civilian resilience initiatives that also benefit Defence
Arctic sovereignty risks through depopulation and out-migration	Infrastructure degradation; service delivery failures; youth out-migration; reliance on external surge	Invest in housing, stable infrastructure, and services; support Indigenous governance; build resilience hubs; treat presence as strategic asset

Table 1. Key threats, vulnerabilities, and mitigation pathways shaping community resilience and Arctic sovereignty in a climate-changed North

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