

Alaska Native Community Resilience



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INTRODUCTION

This short report addresses ways and means by which the Alaska Native community strengthens its resiliency in the face of rapid change. This topic was well introduced in Alaska Day 2018 where Michelle Anderson, President, Ahtna Inc. observed:

Our Elders made our ANCSA land selections based on our traditional hunting and fishing patterns. Thanks to their vision and care for our lands and wise resource management, we are living proof resilience is born from sound resource management and knowing when to take action.¹

The focus of this short report is community economic wellbeing. Notwithstanding its immense significance, social resilience in matters such as suicide prevention is not addressed here.²

DEFINITION

At the outset it may be useful to define resilience in this community economic wellbeing context.

Resilience: The ability of a community to absorb and recover from shocks whilst positively adapting and transforming their structures and means for living in the face of long-term stresses, increasingly rapid change, and uncertainty.³

There is an infinite number of alternate definitions. From a widespread Western perspective, resilience can be seen as the inner strength that helps individuals bounce back and carry on in the face of adversity. Although there is no unified Indigenous view in this regard, there seems to be a common link between resilience and Indigenous identity, land, and history.⁴

It has been observed that adaptation to conditions as serious as a changing environment in Alaska goes beyond resilience. It requires taking actions to address future risks. Adaptation refers to how communities anticipate, plan, and prepare for changing conditions.⁵

STRESSORS ON THE ALASKA NATIVE COMMUNITY

Much of the literature on Arctic resilience focuses on stressors arising from climate change and other environmental challenges and disaster preparedness. Ready to mind Alaska examples are coastal and riverine erosion and the recent earthquake. Other major challenges include responsible resource development, safe Arctic shipping, sustainable Arctic communities, and security and military realities.

1 “Challenges at America’s Northernmost Border,” Alaska Federation of Natives, April 16, 2018, https://www.nativefederation.org/wp-content/uploads/2018/08/AFN_AlaskaDay2018-WEB2-Linked.pdf

2 An example of information resources for social resilience: “Alaska Native Collaborative Hub for Research on Resilience (ANCHRR): Partnerships for Promoting Strengths and Wellbeing as Suicide Prevention,” National Institute of Mental Health, March 20, 2018, <https://www.nimh.nih.gov/about/organization/gmh/ai-an/alaska-native-collaborative-hub-for-research-on-resilience-anchrr-partnerships-for-promoting-strengths-and-wellbeing-as-suicide-prevention.shtml>

3 Definition of resilience adapted from: “Arctic: Traditional Knowledge, Livelihoods and Community Engagement,” Joint Research Centre, European Commission, 2018, <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC112270/kjna29293enn.pdf>

4 “Building resilience in Aboriginal communities,” Anisnabe Kekendazone, <http://akneahr.ciet.org/publications/resilience/>

5 “Adapting to Climate Change: Alaska,” Department of Environment, June 2016, https://www.epa.gov/sites/production/files/2016-07/documents/alaska_fact_sheet.pdf

The changes happening in the Arctic today are driven primarily by external factors. Climate change is the most pervasive and powerful driver of change, but many other environmental changes are taking place as well, alongside rapid social and economic developments. In some contexts, factors such as resource demand, transportation needs, migration, geopolitical changes, and globalization are making the greatest impact on the Arctic. Indeed, many Arctic social-ecological systems face multiple stressors at once.⁶

And as noted in a previous report to AFN, the transition from a nomadic to a settled lifestyle was a change and stressor in many Arctic locations. “The Arctic has been subject to constant change over the centuries. Although we often think of the current, digital age as a time of unprecedented social changes, the transition from a nomadic to a settled lifestyle that occurred through much of the Arctic in the 19th and 20th centuries, primarily as a result of colonization, arguably had a more significant impact. The introduction of the welfare state, universal primary education, and a wage economy introduced further, disruptive changes.”⁷

HOW THE ALASKA NATIVE COMMUNITY RESPONDS

Sound resource management underpins Alaska Native community resilience. Effectively negotiating, updating, and managing the Alaska Native Claims Settlement Act are built on and enhance resiliency. The structure of the numerous corporations was and is a very effective approach. Resiliency is reflected in both commercial and social outcomes.

Indeed, Alaska Natives are the global leader in effective Native development supported by a commercial business regime. This can be a great American model to others.

A related and important factor is the creation and maintenance of 8(a) procurement provisions.

Resilience towards many of the existing stressors requires infrastructure development. As such resilience is influenced by such factors as ways and means to raise capital for infrastructure investments; better cooperation and coordination among governments, military and security bodies, other agencies, and the private sector to reduce risk; building Indigenous participation and benefits; and building sustainable communities. AFN is assessing important issues such as the role of public private partnerships and revenue sharing models.

The role of tradition and ancestry are important factors in Alaska Native community resilience. Some observations by a University of Alaska Fairbanks researcher are footnoted.⁸

Cooperation with other rural Alaskans may enhance the resilience of Alaska Native communities. An example of an effective approach by AFN was the Alaska Marketplace, a business idea competition, modeled after the World Bank Development Marketplace, which was open to all rural Alaskans.

⁶ “Arctic Resilience Report,” Stockholm Resilience Centre, 2016, <https://mediamanager.sei.org/documents/Publications/ArcticResilienceReport-2016.pdf>

⁷ “Introduction,” Change and Innovation in the Arctic: Policy, Society, and Environment, Arctic Yearbook 2017, https://issuu.com/arcticportal/docs/ay17_final_pdf_for_arctic_portal_oc

⁸ “Alaska Native Youth Find Strength, Resilience in Ancient Traditions,” Voice of America News, April 5, 2018, <https://www.voanews.com/a/alaska-native-youth-find-strength-resilience-in-ancient-traditions/4332067.html>

TAKING ACTION

The importance of know-how about taking action has been emphasized. Alaska Day itself reflects an effective approach developed by Alaska Natives in partnership with federal government and other colleagues. And AFN works closely with the Alaska Delegation. The Alaska Delegation seeks to ensure that federal policy is informed by and integrates traditional knowledge and that Alaska community innovation leads America.

Unlike earlier periods of history Alaska Natives have attained the legitimacy and the agency to engage in global politics on their own accord.

It is also worth reiterating that Arctic populations are often identified as being highly vulnerable people, but that's not necessarily what the research shows, according to the geography department at McGill University. People in the Arctic appear to have an inherent ability to adapt to climate change, perhaps because they are so used to accepting a climate that is changeable and uncertain.

One report⁹ advocates that Alaska Natives not tackle climate change or oil issues head on, but rather build socio-economic resilience, defined as Alaska Natives' ability to adapt to ecological disturbance and change in the wider economy. It is deemed essential that villages take measures to insulate themselves from the dominant economic system by building up their local economies with sustainable ventures.

⁹ "Building Alaska Native Village Resilience in a Post-Peak World," Vermont Law Review, February 7, 2013, <https://lawreview.vermontlaw.edu/wp-content/uploads/2013/02/07-Aslan.pdf>

CASE STUDIES OF HOW ALASKA NATIVES RESPOND

Alaska Native communities routinely face what at first blush are intractable village economic problems. Here are three examples suggesting the range of village economic problems and the roster of potential solutions.

“Southeast Alaska Tribal Comprehensive Economic Development Strategy,” Business and Economic Development Dept. of the Central Council of the Tlingit & Haida Indians of Alaska, 2018, <http://www.ccthita.org/info/news/documents/CEDS%20Update.pdf>

Selected Problems

Alaska Natives face a number of challenges to economic development and self-sufficiency including location, unemployment, high cost and low standard of living, and infrastructure issues.

Communities are isolated and a great distance from markets, adding high transportation costs to the price of manufactured goods.

Infrastructure for water, sewer, electricity, transportation, solid waste disposal, and other living necessities are at low capacity and high cost.

Communities are small which tends to limit the breadth and depth of the available workforce.

Native students are more likely to drop out of school.

Transfer payments are a growing share of Native income.

There are 161,000 people in Alaska without access to a wired connection capable of 25mbps download speeds.

Annual government payouts to our citizens in the form of the Permanent Fund Dividend will be reduced moving forward, meaning that fewer dollars will be circulated among local businesses.

Selected Solutions

Microenterprise development: Encourage and support businesses that are properly sized for the user community including microenterprises, home-based businesses. Regional support should include providing small business training and finding financing.

Access to subsistence resources: Coordinated advocacy and support for continued access to subsistence resources on public land.

Support long-term planning.

Increase Communication with Government Officials: There should be coordination with the tribes, and tribal organizations to ensure the proper message is being delivered.

Develop and implement local emergency preparedness plans.

Active involvement of the tribes in economic strategies.

Successful funding of infrastructure projects in communities.

Successful establishment of tribal businesses either located in communities or impacting communities.

Successful establishment of individual businesses in communities.

Improvement in tribal educational levels.

“Alaska Native Villages Work to Enhance Local Economies as They Minimize Environmental Risks,” US Climate Resilience Toolkit, Modified April 2, 2018, <https://toolkit.climate.gov/case-studies/alaska-native-villages-work-enhance-local-economies-they-minimize-environmental-risks>

Selected Problems

Residents of Alaska Native villages face a higher risk of having their traditional subsistence lifestyles affected by Arctic development.

With new technologies and longer periods of ice-free conditions, mining operations on land are also escalating. Most of these activities bring new risks for industrial accidents to remote areas. These risks are of special concern because many areas don't currently have the infrastructure necessary to protect wildlife or subsistence communities from such accidents.

Selected Solutions

Training workshops and conferences in the communities.

Seek joint ventures with organizations in the public and private sectors to provide services such as spill-response and rescue operations.

Building effective partnerships through face-to-face meetings among diverse federal, state, and industry stakeholders and with community and interest groups.

Communities work together to obtain proper training and advocate for themselves.

Secure dedicated funding sources for training.

Develop effective communication plans within communities, and between communities, agencies, organizations, and responsible operating bodies. (share best practices).

Facilitate cross-border communication and cooperation.

Improve understanding of legal authority.

Building capacity at the village level.

Training jumps out as an important resilience factor in the foregoing.

The third example is the Bering Sea Alliance.¹⁰

Rapid warming in the Arctic is a major stressor. New activities will bring new risks for industrial accidents to remote areas. Seven Alaska Native Village Corporations (Gambell, Golovin, Saint Michael, Sitnasuak, Stebbins, Unalakleet, and Wales) formed a limited liability corporation, the Bering Sea Alliance, to have a stronger voice in protecting their subsistence way of life when working with other

¹⁰ “Alaska Native Villages Work to Enhance Local Economies as They Minimize Environmental Risks,” U.S. Climate Resilience Toolkit last modified April 2, 2018, <https://toolkit.climate.gov/case-studies/alaska-native-villages-work-enhance-local-economies-they-minimize-environmental-risks>

groups such as government agencies and private organizations. The aim is to engage in dialogue with key stakeholders to protect the rich abundance of their region while striving to enhance their disadvantaged local economies.

To help Alaska Natives build local capacity to prepare for oil and gas development, the Alliance holds a variety of training workshops and conferences for these communities. It also seeks joint ventures with organizations in the public and private sectors to provide services such as spill-response and rescue operations.

The Alliance is building effective partnerships through face-to-face meetings among diverse federal, state, and industry stakeholders with community and interest groups. The view is that in the face of increasing risks, disaster can be averted if communities work together to obtain proper training and advocate for themselves.

Seven themes to guide future efforts were developed. These are a good illustration of Alaska Native Community response and resilience.

- Secure dedicated funding sources for training, equipment, and infrastructure.
- Ensure meaningful community input into community-specific response plans and associated geographic response strategies.
- Develop and implement training plans for oil spill emergency response in communities.
- Ensure adequate infrastructure, equipment, and logistical resources are available in the region.
- Develop effective communication plans within communities, and between communities, agencies, organizations, and responsible operating bodies.
- Facilitate cross-border communication and cooperation.
- Improve understanding of legal authority, protocols, and roles around subsistence food security.

These three case studies are simply illustrative of the numerous examples of Alaska Native community resilience that could be addressed.

INDIGENOUS KNOWLEDGE AND BUILDING RESILIENCE

There is a large body of literature addressing Indigenous Peoples' special knowledge and its value in determining sound Arctic policy. Indigenous knowledge is of high relevance to enhancing resilience. Some typical observations may include:

- The report examines to what extent communities' ways of knowing, including what is designated as "traditional knowledge", is taken into account in climate related policy documents. The report further explores the progresses made on the communities' involvement in international policy-making processes and initiatives, analyzing public recognition of their traditional knowledge and livelihoods as relevant valuable sources of information and knowledge for planning adaptation to environmental changes in the Arctic.
- Arctic research should be grounded in partnerships between northern communities and scientists. Science and Indigenous knowledge can contribute to a better future for people living in the Arctic, especially if we improve how knowledge is developed, exchanged, and used in policy creation and decision-making processes.

- There is need to prioritize collaborative research that is directed by community interests and gives northerners much more control over research projects and outcomes.
- Arctic research should be shaped by northerners and addresses the needs of northern communities. This will require increased decision-making power for northerners about research funding, and more oversight to ensure that research is conducted in line with community needs.
- Investing in communication infrastructure would support northern-led collaborations by connecting Indigenous knowledge holders, scientists, and decision-makers across a nation.¹¹

CORPORATE INTERFACE WITH INDIGENOUS INNOVATION

ANCSA Corporations are major businesses with substantive intercorporate connections. And in addition Alaska Native communities interact with many major international resource companies. This goes back to the observation about the importance of sound resource management to resilience.

A major North American energy company, Enbridge, has recently issued a discussion paper on their Indigenous Peoples policy.¹² While Enbridge is not at present active in Alaska, this up-to-date example of a major corporation's interaction with Native interests, especially as regards innovation, can be seen as relevant to the issue of Alaska Native community resilience. Here are some excerpts:

While it's true that technological advancements are rapidly changing the way we live and work, sometimes we forget that innovation is about so much more than machine learning, block chain, and "AI." **Innovation driven by Indigenous Nations** and groups in North America is equally important and transformative. Indigenous communities - empowered by constitutional rights, favorable legal decisions, and modernizing regulatory processes - are transforming the way business is done in North America.

It can be difficult to navigate the changing North American landscape on Indigenous issues. Regulatory standards are shifting, and approaches by government agencies and courts can vary by region. More importantly, the **expectations of Indigenous Peoples** themselves are evolving, and consensus on what represents clear, consistent, and dependable processes and standards is still emerging.

Because innovation and the development of new practices are both keys to performance improvement, Enbridge pursues opportunities to **work with interested Indigenous communities on new approaches**. The Company is currently engaged in joint projects or initiatives with Indigenous Nations and groups residing near our projects and operations that are co-designing and testing new approaches to monitoring, water protection, employment, and supply chain management across the life cycle of our assets.

¹¹ This article is representative. Arctic policy must embrace Indigenous knowledge and Arctic science, April 12, 2018, <http://policyoptions.irpp.org/magazines/april-2018/arctic-policy-must-embrace-Indigenous-knowledge-and-arctic-science/>
¹² "Indigenous Rights and Relationships in North American Energy Infrastructure," Enbridge, June 2018, https://www.enbridge.com/-/media/Enb/Documents/CSR/Reports/Enbridge_Discussion_Paper_Indigenous_Rights_Relationships.pdf

Another thought provoking report on the significance of Indigenous business, in this instance the Australian case, is:

“The contribution of the Indigenous business sector to Australia’s economy”

PricewaterhouseCoopers

April 2018

<https://www.pwc.com.au/indigenous-consulting/assets/the-contribution-of-the-indigenous-business-sector-apr18.pdf>

RESILIENCE THROUGH INNOVATION IN ALASKA NATIVE COMMUNITIES

Numerous historical examples of Alaska Native resilience and adaptation can be cited.¹³

Alaska Native Transportation. For over 10,000 years, Indigenous People have occupied Alaska and have needed safe transportation through the snow and ice in subzero temperatures. To achieve this Alaska Native people created some most efficient and eco-friendly forms of transportation.

Alaska Native Trade with Asia. Two leaded bronze artifacts found in northwestern Alaska are the first evidence that metal from Asia reached prehistoric North America prior to contact with Europeans.

Metallurgy of the Tlingit, Dene, and Eskimo. The historic metallurgy of the Tlingit, Dene, and Eskimo represent a sophisticated industry in native metals.

The Physics of Hunting. Arctic hunters travel miles over snowy landscapes to find prey that hide underwater. Hunters use the physics of light, sound, water, and materials to increase their chances of success.

Tools and Devices. Alaskan provenance can potentially be claimed for snow goggles, the ulu knife, crampons, various natural medicines, and so forth.

And resilience through innovation continues, with these present examples.

Energy Innovation. In Alaska, 70 of some 200 remote communities are augmenting their power grids with bio-mass, geothermal, hydro, wind, solar, and wave energy.

Alaska and the Knowledge-based Economy. Small Alaska communities sometime demonstrate high levels of knowledge production in a few niche industries, articulating the importance of individual-driven and niche-based innovation in remote regions.

ANCSA Corporations. One particularly promising model for building a more entrepreneurial culture in the Arctic is the development of Native Corporations. Alaska Natives have been successful in using the Alaska Native Claims Settlement Act to advance Native interest in developing economic opportunities while maintaining traditional values.

¹³ “Contrasts and Comparisons in Arctic Innovation by Indigenous Peoples,” Report to AFN, North West International Ltd., August 29, 2018

OVERARCHING PRINCIPLES GOING FORWARD

Four overarching priorities for the Arctic Resilience Action Framework were adopted in the 2017 Fairbanks Ministerial Declaration by the eight Arctic Council States and six Permanent Participants. These priorities may be worthy of consideration by AFN in future assessments.

- Analyzing and Understanding Risk and Resilience in the Arctic
- Building Resilience and Adaptation Capacity
- Implementing Resilience with Policy, Planning, and Cooperation
- Encouraging Investment to Reduce Risk and Build Resilience¹⁴

Within these four principles above, perhaps the role of innovation in building resilience is a particular area for assessment.

OTHER OBSERVATIONS

Alaska Native Village Adaptation. One example of recent research¹⁵ addresses Alaska Native village adaptation. The author observes that there is not a coordinated framework to address adaptation at either the national or state level. In particular the work identifies a need to shift institutional focus toward helping Alaska Native villages implement and sustain efforts to avoid flooding and erosion, along with efforts that improve food security and economic and social wellbeing.

An interesting development in Arctic Finland... pre-commercial and challenge-based procurements to encourage innovation. Recent recommendations¹⁶ to support responsible development in the Arctic region of Finland include the following: Create clear and supportive structures for Finnish businesses and for Finland to seize international Arctic opportunities, including utilizing pre-commercial and challenge-based procurements to encourage innovation and environmental protection. One can speculate as to the value of a similar emphasis on U.S. 8(a) procurement provisions, especially as they may affect ANCSA Corporations.

SELECTED INTERNATIONAL REFERENCES ON ARCTIC RESILIENCE

While this short report focuses on Alaska, some potentially useful information sources for a wider assessment were encountered. Of particular note are:

The Arctic Resilience Report is an effort to better understand the nature of Arctic change, including critical tipping points, as well as the factors that support resilience, and the kinds of choices that strengthen adaptive capacity. This Arctic Council project was led by the Stockholm Environment Institute and the Stockholm Resilience Centre. It was undertaken in consultation with Arctic countries

¹⁴ “The Arctic Resilience Action Framework: A New Paradigm for Regional Cooperation to Build Resilience,” U.S. Department of the Interior, 2017, https://arcticyearbook.com/images/yearbook/2017/Briefing_Notes/1_The_Arctic_Resilience_Action_Framework.pdf

¹⁵ “Presenting a Picture of Alaska Native Village Adaptation: A Method of Analysis,” *Sociology and Anthropology*, 2017, <http://www.hrpub.org/download/20170830/SA8-19609924.pdf>

¹⁶ “Finland’s Journey towards the Forefront of Responsible Arctic Development: Recommendations,” Government of Finland, 2016, <https://www.utu.fi/fi/yksikot/mkk/spc/Documents/Barometrit/MERMAID-policy-brief-en-2016.pdf>

and Indigenous Peoples, and included collaboration with several Arctic scientific organizations.

“Arctic Resilience Report”

Stockholm Resilience Centre

2016

<https://mediamanager.sei.org/documents/Publications/ArcticResilienceReport-2016.pdf>

Additional valuable material is found in the forerunner to the above report.

Arctic Resilience

Interim Report 2013

“Indigenous perceptions of resilience”

https://www.researchgate.net/publication/290428810_Indigenous_perceptions_of_resilience

This European Commission report seeks to provide evidence-based scientific support to the European policymaking process.

“Arctic: Traditional Knowledge, Livelihoods and Community Engagement”

Joint Research Centre, European Commission

2018

<http://publications.jrc.ec.europa.eu/repository/bitstream/JRC112270/kjna29293enn.pdf>

Resilience initiatives are gaining increasing attention and priority at the World Bank. Across the world, donors and a broad array of stakeholders are seeking to understand whether climate change adaptation, disaster risk management, and other resilience interventions are working.

“Options for Results Monitoring and Evaluation for Resilience Building Operations”

World Bank

April 2016

<http://documents.worldbank.org/curated/en/577241468184764561/pdf/105159-WP-P155632-PUBLIC-Resilience-ME-Scoping-Paper-5April2016-FOR-PUBLICATION.pdf>

The Organisation for Economic Cooperation and Development has developed a tool to assess the level of resilience in a society or community. The intention is to enable partner governments and donors to target investment in effective resilience building programs.

“Guidelines for resilience systems analysis: How to analyse risk and build a roadmap to resilience”

Organisation for Economic Cooperation and Development

2014

<https://www.oecd.org/dac/conflict-fragility-resilience/Resilience%20Systems%20Analysis%20FINAL.pdf>

A straightforward powerpoint to inform local government administrators in Canada’s Northwest Territories.

“Building Resilience and Capacity in Canada’s North: A Practical Approach to Community Development”

The Conference Board of Canada

October 6, 2015

<http://lgant.com/sites/default/files/Building%20Resilience%20and%20Capacity%20in%20Canada%27s%20North.pdf>

The brief literature review also finds a useful summary¹⁷ of the response of Arctic peoples to various changes, shocks, and regime shifts. Examples from Arctic North America are noted in an Annex to this report.

It is perhaps noteworthy that resilience features prominently in three major international agreements: the Sustainable Development Goals, the Paris Agreement on Climate Change, and the Sendai Framework for Disaster Risk Reduction.

ANNEX

International Case Studies of Arctic Resilience

Cases exhibiting resilience are those in which the social-ecological system has been able to maintain its identity, function, and structure despite changes in the broader social or ecological context.

Savoonga – Maintaining traditional Yupik whaling practices – USA

The St. Lawrence Island Yupik whalers created a new whaling season. The case shows the potential for innovation and adaptation to help offset some impacts from a changing climate and how legislation can support this.

Dempster Highway – Highway development and Porcupine caribou herd – Canada

This case study focuses on how the introduction of this new infrastructure transformed local social systems and the way in which they deal with their primary resources; the Porcupine caribou herd.

Bering Strait – Arctic shipping – International

This case study involves biophysical as well as socio-economic components. The changes in sea ice is opening for increased boat traffic, while having varying effects on marine mammals. All three of the main shipping routes across the Arctic Ocean pass through the Bering Strait. It is likely that ship strikes and whale deaths are likely to occur and increase without proactive policy.

Cases of loss of resilience are those in which there has been a loss of livelihoods, identity, function, and structure.

Great Northern Peninsula – Seal industry – Canada

While this case is set in the sub-Arctic, the impacts of international drivers in the form of animal welfare pressure on the trade of seal products faced by seal hunters here are similar around the Arctic. This case focuses on how these external demands have impacted the industry in Newfoundland.

Great Northern Peninsula – Cod fishery collapse – Canada

Cod fishing was the economic focus of Newfoundland and essential to the well-being of the communities of the Great Northern Peninsula. The collapse of the cod fishing industry and the moratorium in 1992 led to out-migration and new fisheries such as crustaceans.

¹⁷ “Arctic social-ecological case studies,” Stockholm Resilience Centre, 2016, <https://www.stockholmresilience.org/research/research-streames/complex-adaptive-systems/arctic-resilience-report-2016/arctic-social-ecological-case-studies.html>

Newtok – Climate change-driven relocation of coastal Indigenous communities – USA

Along parts of the Alaskan coastline, increased wave action due to melting sea ice combined with thawing permafrost is causing rapid coastal erosion forcing relocation of Newtok and of at least 12 other communities. Relocation is complicated by cultural, financial, and jurisdictional factors, and it remains unclear how to best implement the relocation plans.

Paamiut – Cod to shrimp fishery transition – Greenland

Greenland experienced a cod-to-shrimp transition in the 20th century mediated by climatic changes and overfishing. This case focuses on this transition in the west Greenland community of Paamiut in terms of how ecological, socio-economic, and institutional factors influenced the outcome of this transition.

Disko Bay – Sea ice reduction's impact on resource dependent communities – Greenland

Since the 1980s, the climate in Disko Bay has warmed substantially and sea-ice cover has reduced by 50%, and freezing later. Change in sea-ice has direct impacts for transport, food security, safety, gender roles, etc. Although local residents have learnt how to cope with changing ice conditions current government regulations and new living conditions limit local residents' ability to be flexible and mobile to manage environmental change.

Qaanaaq district – Migratory fishers and hunters to re-located communities – Greenland

As the melting of ice arrives earlier each summer, mobility has been strongly affected, fishing and hunting is becoming more difficult and risky. With less mobility there are also weaker social bonds between communities, which are key to face the challenges of long cold winters. As consequence many are moving to the cities and young people do not find incentives to continue with traditional livelihoods and local practices.

Cases exhibiting transformation are those in which people have acted to purposefully modify the system's identity, function, and structure to better suit their needs.

Cape Dorset – From nomadic hunters to international art sensations – Canada

The Inuit of Cape Dorset Canada are navigating a 60-year transformation from nomadic hunters to international art sensations. The Inuit of Cape Dorset demonstrate resilience to systematic colonization and repression of their language and culture as well as dramatic ecological changes in sea-ice vital to Inuit food security and well-being.

Sisimiut – Cod to shrimp fishery transition – Greenland

Greenland experienced a cod-to-shrimp transition in the 20th century mediated by climatic changes and overfishing. This case focuses on a successful transition in Sisimiut in terms of how ecological, socio-economic and institutional factors influenced the outcome of this transition.

Igloolik – Food security in Arctic Inuit community – Nunavut, Canada

As for many Indigenous Arctic communities, Igloolik's food system has expanded to become dual: food security is determined by harvested traditional foods and store-bought foods imported from mainland Canada. This case illustrates the need for the new food systems to be integrated with traditional food systems in order to enhance rather than reduce both food security and culture.



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