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## ADAPTING TRADITIONS TO CLIMATE CHANGE

### The Impact on Indigenous Food Systems in the North American Arctic

#### ABSTRACT

Indigenous Arctic communities rely on native species for sustenance, medicine, ceremony, and economy. Nearly half face food insecurity, worsened by climate change disrupting traditional foodways. This review examines climate change impacts on food systems and the adaptive strategies preserving cultural connections and food security.

#### CULTURAL ACKNOWLEDGMENT

In writing this paper, we respectfully acknowledge the Indigenous communities whose knowledge, traditions, and resilience have greatly informed our understanding of the issues discussed.<sup>1</sup> As non-Indigenous academics, we recognise the limitations of our perspectives and the importance of centring Indigenous voices in conversations about food systems, climate change, and health.

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1 Reference to this study: Kristen Autret and Christopher Hollander: Adapting Traditions to Climate Change: The Impact of Climate Change on Indigenous Food Systems in the North American Arctic. In Anikó Báti and Patricia Lysaght (eds.): *Living Eating Habits, Revitalized Foodways and the Concepts of Tradition and Food Heritage*. Budapest: ELTE RCH Institute of Ethnology – Museum of Ethnography, 2025. pp. 311–324.

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## INTRODUCTION

The Indigenous communities of the North American Arctic (NAA) have long sustained their cultural, economic, and physical well-being through traditional food systems that are closely tied to the natural environment. These systems encompass the harvesting, preparation, and consumption of native species, which are vital, not only for sustenance, but also for maintaining social cohesion, cultural identity, and spiritual practices.<sup>2</sup>

However, these traditional foodways face growing threats from the rapid impacts of climate change, particularly Arctic amplification – the phenomenon of accelerated warming in the Arctic.<sup>3</sup> This warming leads to drastic changes in ecosystems, including significant shifts in species distribution, reduced ice cover, and altered weather patterns.<sup>4</sup> Simultaneously, colonialism’s legacy – manifested through forced displacement, loss of land, and government-imposed agricultural policies – continues to undermine the resilience of Indigenous food systems (IFS). This legacy has left these communities more vulnerable to climate-related disruptions.<sup>5</sup>

## COLONIAL DISRUPTIONS

The food systems of Indigenous communities across North America have been profoundly disrupted by colonial policies, forced relocations, and environmental degradation. These measures not only altered the landscapes that they rely on for sustenance, but also eroded cultural knowledge and practices, leading to a significant decline in traditional foodways.<sup>6</sup> Government regulations and legal barriers restricted indigenous peoples’ ability to hunt, fish, and gather traditional foods,

2 Ford, J.D.: ‘Vulnerability of Inuit food systems to food insecurity as a consequence of climate change: a case study from Igloolik, Nunavute’, *Regional Environmental Change* 9 (2008), 84–85.

3 Rantanen, M. – Karpechko, A.Y. – Lipponen, A. – Nordling, K. – Hyvärinen, O. – Ruosteenoja, K. – Vihma, T. and Laaksonen, A.: ‘The Arctic has warmed nearly four times faster than the globe since 1979’, *Communications Earth & Environment* 3 (2022), 1–2.

4 White, D.M. – Gerlach, S.C. – Loring, P. – Tidwell, A.C. and Chambers, M.: ‘Food and water security in a changing arctic climate’, *Environmental Research Letters* (2007), 2–3.

5 Malli, A.H. – Monteith, H. – Hiscock, E.C. – Smith, E.V. – Fairman, K. – Galloway, T. and Mashford-Pringle, A.: ‘Impacts of colonization on Indigenous food systems in Canada and the United States: a scoping review’, *BMC Public Health* (2023), 3–4.

6 White, et al.: ‘Food and water security in a changing arctic climate’, *Environmental Research Letters* (2007), 4–5.

exacerbating food insecurity and long-term health disparities, particularly among Indigenous children.<sup>7</sup>

In both Canada and the United States, forced relocations such as those mandated by the Indian Act (1876) and the Inuit High Arctic Relocations, systematically dismantled Indigenous self-sufficiency by displacing communities from their ancestral lands.<sup>8</sup> Many groups, such as the Inuit, Métis, and the tribes of the Wabanaki Confederacy – including the Mi'kmaq, Maliseet, Passamaquoddy, and Penobscot – suffered severe disruptions to their seasonal cycles of hunting, fishing, and gathering.<sup>9</sup>

The imposition of residential schools further exacerbated the loss of traditional food-practices across generations, particularly for the Iñupiat in Alaska and Inuit in Canada.<sup>10</sup> As communities were relocated to marginal lands, they became increasingly dependent on imported, processed foods, replacing culturally significant staples. This shift to western diets had devastating public and individual health consequences, worsening food insecurity.

For many of these communities, the disconnection from traditional lands was compounded by hunting and fishing regulations that curtailed access to vital food sources. Indigenous peoples' rights to fish were overridden by government-imposed conservation measures which ignored the cultural and nutritional importance of species like seal, whale, and caribou.<sup>11</sup>

Industrial development across Canada, particularly mining and logging, further contaminated water sources and reduced access to traditional food systems. This activity has also led to the contamination of fish and game with environmental

7 Malli, et al.: 'Impacts of colonization on Indigenous food systems in Canada and the United States: a scoping review', 6–7.

8 Grant, S.D.: 'Errors Exposed: Inuit Relocations to the High Arctic, 1953–1960', *Documents on Canadian Arctic Sovereignty and Security* (DCASS) (2016), 1–14.

9 Lynn, K. – Daigle, J. – Hoffman, J. – Lake, F. – Michelle, N. – Ranco, D. – Viles, C. – Voggesser, G. and Williams, P.: 'The impacts of climate change on tribal traditional foods', *Climatic Change* (2013), 40.

10 Brinkman, T.J. – Hansen, W.D. – Chapin III, F.S. – Kofinas, G. – BurnSilver, S. and Rupp, T.S.: 'Arctic communities perceive climate impacts on access as a critical challenge to availability of subsistence resources', *Climatic Change* (2016), 414–417.

11 Domingo, A. – Charles, K.A. – Jacobs, M. – Brooker, D. and Hanning, R.M.: 'Indigenous community perspectives of food security, sustainable food systems and strategies to enhance access to local and traditional healthy food for partnering williams treaties first nations (Ontario, Canada)', *International Journal of Environmental Research and Public Health*, (2021), 2–8.

pollutants, causing government advisories to discourage the consumption of traditional foods, as seen in the Sahtú and Dehcho regions of the Northwest Territories.<sup>12</sup> This disconnection from traditional lands and resources not only created food insecurity but also led to a loss of cultural identity, as Indigenous peoples became increasingly reliant on processed, store-bought foods, which are nutritionally inferior and culturally disconnected from traditional practices.<sup>13</sup>

#### THE ECOLOGICAL AND CLIMATE THREATS TO IFS

Arctic amplification is accelerating the disruption of ecosystems, leading to increased difficulty in predicting migrations and access to traditional food sources.<sup>14</sup> Climate change significantly alters food sources, weather patterns, and traditional subsistence activities. First Nations in the Northwest Territories have observed shifts in migratory bird patterns, earlier spring thaws, and an increase in beaver populations – all of which disrupt traditional hunting and food preparation practices.<sup>15</sup> Similarly, in the Yukon, declining rainfall and snowfall, which affect berry harvests and water availability, force adaptations in their subsistence strategies.

Inuit communities across the Canadian Arctic are also witnessing profound changes in their environment. Traditional hunting practices are becoming increasingly difficult due to shifting sea-ice patterns, rising temperatures, and altered wildlife migration routes. For instance, in Alaska, migration routes of key species such as bowhead whales and caribou have shifted, complicating traditional hunting practices. As a result, there has been increased reliance on processed foods in the region, leading to further health and cultural impacts.

Other Indigenous communities in Alaska, face additional challenges, including permafrost instability and changes in freshwater availability. These disruptions are

12 Ramirez, P.M. – Ratelle, M. – Laird, B.D. and Skinner, K.: 'Dietary Intakes of Traditional Foods for Dene/Métis in the Dehcho and Sahtú Regions of the Northwest Territories', *Nutrients* 14/2 (2022), 3–8.

13 Domingo, et al.: 'Indigenous community perspectives of food security, sustainable food systems and strategies to enhance access to local and traditional healthy food for partnering williams treaties first nations (Ontario, Canada)', 7–9.

14 Serreze, M.C. and Barry, R.G.: 'Processes and impacts of Arctic amplification: A research synthesis', *Global and Planetary Change* (2011), 85–88.

15 Guyot, M. – Dickson, C. – Paci, C. – Furgal, C. and Chan, Hing Man: 'Local observations of climate change and impacts on traditional food security in two northern Aboriginal communities', *International Journal of Circumpolar Health* 65/5 (2006), 403–415.

affecting the distribution of fish and game, and are driving communities toward store-bought foods, undermining the cultural integrity of their diets.<sup>16</sup>

Across these regions, the effects of climate change are both environmental and cultural. The disruption of traditional foodways threatens the transmission of knowledge, the preservation of cultural identity, and the long-term sustainability of IFS. These impacts go beyond physical sustenance, as the erosion of traditional practices has deep cultural consequences. This convergence of environmental and cultural disruptions underscores the urgent need for strategies that protect both ecological balance and Indigenous cultural heritage.

## RESILIENT FOOD SYSTEMS

IFS in many Arctic and subarctic communities are still dynamic and evolving, incorporating ancient knowledge with contemporary practices. Many Indigenous and local communities have mixed food systems that combine subsistence activities like hunting, fishing, foraging, and small-scale farming with market-based activities.<sup>17</sup> This blending of traditional and modern approaches to food provision exemplifies the resilience of IFS, which adapt to changing conditions while preserving cultural values. The integration of traditional knowledge with modern technologies helps Indigenous communities to better navigate and mitigate climate impacts on food systems.<sup>18</sup>

In Canada's Northwest Territories, Dene Nation communities heavily depend on fish like whitefish, pike, and grayling, with 86% of the population consuming fish daily.<sup>19</sup> Similarly, Yukon's White River First Nation relies on moose, salmon, and

16 Loring, P.A. and Gerlach, S.C.: 'Searching for progress on food security in the North American North: a research synthesis and meta-analysis of the peer-reviewed literature', *Arctic Institute of North America* (2015), 386–387.

17 Galappaththi, E.K. and Schlingmann, A.: 'The sustainability assessment of Indigenous and local knowledge-based climate adaptation responses in agricultural and aquatic food systems', *Current Opinion in Environmental Sustainability* (2023), 1, 6, 24.

18 Raheem, D. – Holopainen, A. – Koegst, J. – Tulimaa, M. and Benkherouf, M.: 'Promoting Sustainability within the Nordic-Arctic Region's Food System: Challenges and Trends', *Sustainability* (2022), 1–9.

19 Guyot, M. – Dickson, C. – Paci, C. – Furgal, C. and Chan, H.M.: 'Local observations of climate change and impacts on traditional food security in two northern Aboriginal communities', *International Journal of Circumpolar Health* (2006), 413.

berries, drawing on ancestral practices to sustain resources and to preserve their food systems for future generations.

The Inupiat and Inuit peoples of Alaska and Canada, maintain a deep connection to traditional foods such as ringed seal, caribou, Arctic char, bowhead whale, beluga whale, and narwhal. These food systems are integral to social structures, as cultural norms governing food sharing strengthen community bonds and promote equitable resource access.<sup>20</sup> The gendered division of labour, where men hunt and women process the meat, plays a key role in maintaining cultural traditions and passing them down to future generations. These practices reflect the resilience of Inuit food systems.

For First Nations communities in Manitoba, food practices hold spiritual significance. The process of growing, harvesting, and consuming food connects these communities to the earth and to each other, reinforcing both cultural values and spiritual well-being.<sup>21</sup>

#### CULTURAL RESILIENCE AND FOOD SOVEREIGNTY

Indigenous communities across the Arctic and subarctic regions have exhibited remarkable resilience in preserving their cultural food practices despite challenges such as climate change, environmental degradation, colonialism, and modernisation. This resilience is deeply rooted in the connections between food, culture, and identity, and is sustained through traditional knowledge, adaptive strategies, and strong commitment to food sovereignty.

At the heart of this resilience is the concept of food sovereignty, which emphasises the right of communities to access healthy, culturally-relevant food, produced through sustainable and environmentally-sound methods. It also includes the right for communities to shape and manage their own food and agricultural systems.<sup>22</sup> Indigenous communities' efforts to gain control over their food systems are essential

20 Brinkman, T.J. – Hansen, W.D. – Chapin III, E.S. – Kofinas, G. – BurnSilver, S. and Rupp, T. S.: 'Arctic communities perceive climate impacts on access as a critical challenge to availability of subsistence resources', *Climatic Change* (2016), 415–416.

21 Cidro, J. – Adekunle, B. – Peters, E. and Martens, T.: 'Beyond food security: Understanding access to cultural food for urban Indigenous people in Winnipeg as Indigenous food sovereignty', *Canadian Journal of Urban Research* (2015), 34–35.

22 Malli et al.: 'Impacts of colonization on Indigenous food systems in Canada and the United States: a scoping review', 3–6.

for preserving cultural heritage for future generations. Access to key species, listed in Table 1, is not only about sustenance but also about maintaining cultural identity.

The Iñupiat communities exemplify this resilience by adapting their hunting practices to environmental changes, such as shifts in the migration patterns of bowhead whales and caribou. These communities have modified their hunting techniques and timing to align with changing conditions. Elders and hunters collaborate to track new migration routes, ensuring that traditional knowledge continues to guide their subsistence practices. Despite the scarcity of traditional food sources, communal food sharing remains central to Iñupiat life, reinforcing social bonds and preserving cultural cohesion.<sup>23</sup>

Similarly, Indigenous communities across Canada have employed diverse strategies to strengthen and revitalise their food systems. They have reintroduced indigenous crops, revived traditional hunting practices, and established community gardens through social structures such as traditional seed networks and communal labour practices.<sup>24</sup> These efforts, supported by both traditional and modern practices, have enabled communities to adapt to environmental changes while preserving their cultural ties to the land. The integration of sustainability indicators and co-management strategies has been vital in maintaining resilience and ensuring the survival of cultural identity through evolving food systems.

The practice of food sharing and communal resource management remains a cornerstone of cultural resilience across these Indigenous communities. Whether in the Iñupiat or Inuit communities, these practices support the preservation of cultural knowledge and foster food security in the face of environmental challenges. By integrating cultural practices with modern sustainability approaches, Indigenous communities ensure that their food systems continue to reflect and reinforce their cultural identities.

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23 Brinkman et al.: 'Arctic communities perceive climate impacts on access as a critical challenge to availability of subsistence resources', 421–423.

24 Cidro et al.: 'Beyond food security: Understanding access to cultural food for urban Indigenous people in Winnipeg as Indigenous food sovereignty', 30.

Land Mammals	Marine Mammals	Waterfowl and Birds	Fish and Sea-food	Wild Berries	Wild and Medicinal Plants	Western Foods
Beaver	Bearded seal	Canada goose	Arctic char	Blackberry	Acorns	Canned fruit
Bison	Beluga whale	Grouse	Arctic grayling	Blueberry	Brodiaea	Canned meat
Buffalo	Bowhead whale	Long-tailed duck	Brook trout	Chokecherry	Camas	Chips
Caribou	Narwhal	Partridge	Burbot	Cloudberry	Cedar	Juice
Deer	Ringed seal	Spruce grouse	Chum salmon	Cranberry	Fireweed	Snack foods
Elk	Seal	White-fronted goose	Cisco	Currant	Kelp	Soda
Marten	Walrus		King salmon	Elderberry	Labrador tea	Sweetened drinks
Moose	Whale		Lake trout	Gooseberry	Lilies	
Muskox			Northern pike	High-bush cranberry	Lomatium	
Otter			Pike	Huckleberry	Onions	
Polar bear			Rainbow smelt	Lingonberry	Sage	
Rabbit			Shad	Raspberry	Seaweed	
			Sturgeon	Salal berry	Sweetgrass	
			Sucker	Salmonberry	Tobacco	
			Trout	Shadberry	Yarrow leaf	
			Whitefish	Strawberry		

Table 1. *Traditional Foods Integral to Indigenous Diets and Cultural Practices. Indigenous knowledge and sustainability*

## INDIGENOUS KNOWLEDGE AND SUSTAINABILITY

Indigenous and Local Knowledge (ILK) has been the cornerstone of sustainable food systems within Indigenous communities for generations. This knowledge, grounded in cultural practices, keen observations of the environment, and adaptive strategies, is crucial not only for the sustainability of food systems but for the survival of Indigenous cultures. ILK embraces a holistic worldview, with the health of each element contributing to the overall balance of the ecosystem. This knowledge, passed down through generations, has enabled Indigenous communities to maintain resilient and sustainable food systems in the face of both environmental and social challenges.

For example, the Anishinaabe and other Indigenous groups approach ecosystem management with a spiritual connection to the land, utilising practices such as ceremonial seasonal harvesting and controlled burns, to maintain natural cycles.<sup>25</sup> ILK is a dynamic and evolving process, continuously shaped by interaction with the environment.<sup>26</sup> Practices, such as sustainable harvesting and biodiversity preservation, play a vital role in ensuring the long-term health of ecosystems. The transmission of Indigenous knowledge across generations is vital for sustaining food systems, combining cultural values with ecological practices. Elders share insights on animal behaviour, weather, and environmental cycles, through stories, rituals, and hands-on experiences, ensuring the continuity of sustainable hunting, fishing, and gathering techniques.

Across diverse Indigenous communities, sustainability practices are deeply embedded in ILK. Inuit communities in Nunavut, for example, use their intimate understanding of Arctic marine ecosystems to manage their resources, including seals, whales, and fish, in a sustainable manner under changing ice conditions. Adhering to traditional regulations and taboos helps to prevent overharvesting and ensures the viability of critical resources. These practices are not solely focused on resource conservation but are also about maintaining the cultural and spiritual connections to the land.

In the Northwest Territories, ILK is also applied to rotational hunting and fishing, allowing ecosystems to recover between harvests. This practice ensures that wildlife

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25 McGregor, D.: 'Coming full circle: Indigenous knowledge, environment, and our future', *American Indian Quarterly* (2004), 393.

26 Mazzocchi, F.: 'A deeper meaning of sustainability: Insights from indigenous knowledge', *The Anthropocene Review* (2020), 35–36.

populations remain stable, and that ecosystems remain healthy, over the long term.<sup>27</sup> Such approaches have proven resilient to environmental changes and remain vital to the sustainability of food systems.

Many Indigenous communities are now blending traditional knowledge with modern sustainability practices to adapt to new realities. In urban areas, Indigenous communities in Winnipeg are integrating traditional food practices with urban agriculture and local food-sovereignty initiatives, ensuring the continued relevance of ILK even in non-traditional settings.<sup>28</sup> These efforts create spaces where traditional knowledge continues to play a significant role in sustaining food systems.

Globally, Indigenous communities are using ILK to respond adaptively to climate change. Responses include crop diversification, co-management of resources with governments, and community-led governance models that emphasise sustainable resource management. By integrating traditional knowledge with modern practices, Indigenous communities build resilience and sustain their food systems in the face of ongoing climate challenges.

#### ADAPTATIONS TO FOOD SYSTEM CHALLENGES

Indigenous communities across the NAA and subarctic regions have demonstrated resilience in the face of mounting environmental, social, and economic pressures. By combining traditional ecological knowledge with modern technology, these communities are finding innovative ways to sustain their food systems and preserve their cultural identities. Inuit hunters have incorporated snowmobiles into their traditional hunting practices, allowing them to both navigate the changing ice and terrain caused by the effects of climate change and to introduce modern conveniences. Snowmobiles increase mobility, which is crucial as animals' migration routes shift, enabling hunters to continue subsistence practices while preserving cultural traditions. This fusion of past and present ensures that traditional foodways remain viable, even in changing environmental conditions.

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27 Kuhnlein, H.V.: 'Food system sustainability for health and well-being of Indigenous Peoples', *Public Health Nutrition* (2015), 2419–2424.

28 Cidro et al.: 'Beyond food security: Understanding access to cultural food for urban Indigenous people in Winnipeg as Indigenous food sovereignty', 30–32.

In both rural and urban settings, Indigenous communities are also reclaiming control over their food systems through food sovereignty initiatives. Young people play a critical role in revitalising these food systems, using urban gardens and education programmes to reconnect with traditional foodways.<sup>29</sup> These community-led initiatives not only enhance food security but also foster a renewed sense of cultural pride and resilience. The role of community-driven solutions and Indigenous-led governance is pivotal for climate adaptations and food sovereignty.

Climate change has posed significant challenges to traditional food systems, but many Indigenous communities have shown adaptability in this context. In Alaska, for example, communities have adjusted their subsistence strategies in response to shifts in the migration routes of species like bowhead whales and caribou. By altering the timing of their hunts and modifying traditional techniques, they have been able to navigate the impacts of warming temperatures and shifting ice patterns. These adaptations are guided by an understanding of the environment, passed down through generations, which allows for flexibility in subsistence practices while maintaining cultural values.<sup>30</sup>

Food-sharing networks also play a crucial role in sustaining Indigenous communities. Despite increasing challenges in accessing traditional foods, many communities have maintained the practice of sharing food communally, thereby ensuring that everyone has access to culturally-significant resources. These networks strengthen social bonds and reflect the value placed on collective well-being. Sharing food goes beyond survival, reinforcing cultural practices of reciprocity, mutual support, and egalitarian community cohesion, that are integral to the social fabric of these communities.

In addition to hunting and fishing, some Indigenous communities are working to revitalise traditional agricultural practices and to reintroduce Indigenous crops.<sup>31</sup> By blending traditional farming knowledge with modern sustainability practices, such as permaculture and regenerative agriculture, these communities are creating resilient, localised food systems. These efforts are critical for strengthening food

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29 Bagelman, C.: 'Unsettling food security: the role of young people in Indigenous food system revitalisation', *Children & Society* (2018), 222–224.

30 Charlton, G.: 'The law of Native American hunting, fishing and gathering outside of reservation boundaries in the United States and Canada', *Canada-United States Law Journal* (2015), 6–7.

31 Bodirsky, M. and Johnson, J.: 'Decolonizing diet: healing by reclaiming traditional Indigenous foodways', *Cuizine* 1/1 (2008), 'Abstract'; <<https://cimcc.info/system/files/atoms/file/Decolonizing%20Diet%20Healing%20by%20Reclaiming%20Traditional.pdf>> accessed 6 May 2025.

sovereignty and reconnecting people with their cultural food practices. The revitalisation of traditional crops is also a powerful act of cultural restoration, enabling communities to regain control over their food production while reinforcing their ties to the land.

## CONCLUSION

Indigenous communities in the Arctic and subarctic regions of North America face profound challenges related to food security, climate change, and the preservation of traditional foodways. The impacts of environmental degradation, industrial development, and colonial legacies, continue to undermine the cultural and nutritional sustainability of these communities. Climate change is drastically altering ecosystems, reducing access to traditional foods, and exacerbating health disparities across Indigenous populations.

Despite these challenges, Indigenous communities have demonstrated resilience. Adaptive strategies, rooted in Indigenous knowledge and cultural practices, provide insights into sustainable food systems that prioritise both human and ecological well-being. Indigenous communities demonstrate resilience in the face of environmental changes through communal food-sharing networks, sustainable harvesting practices, and the integration of traditional knowledge with modern innovations.<sup>32</sup>

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32 Young, T.K. – Broderstad, A.R. – Sumarokov, Y.A. and Bjerregaard, P.: 'Disparities amidst plenty: a health portrait of Indigenous peoples in circumpolar regions', *International Journal of Circumpolar Health* (2020), 8–9.

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