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14 Community-led initiatives as innovative responses

Shaping the future of food security and food sovereignty in Canada

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Introduction

The hunting, harvesting, sharing, processing, storing, and consumption of traditional food in Indigenous communities in Canada's Arctic and Provincial North, have social and cultural benefits, which are key determinants of health (Council of Canadian Academies 2014, 76, 81). Moreover, land use and land-based cultural practices involving traditional foods (e.g., spending time on the land harvesting, preparing, and sharing food with relatives) also improve the nutritional quality of Indigenous People's diets (Kuhnlein and Receveur 2007; Sheehy et al. 2015). These practices, are still key to Indigenous wellbeing and identity, even if a large portion of contemporary northern diets is composed of store-bought food (Cuerrier et al. 2012; Kant et al. 2013; Boulanger-Lapointe et al. 2019).

In recent decades, settler colonialism across the Canadian Arctic and Provincial North including forced sedentarisation and the construction of permanent infrastructures (e.g., airports for bringing food to the North) have profoundly affected aboriginal peoples' ability to meet their nutritional needs and desires in a way that responds to their cultural needs and holistic health, which acknowledges the relationships between people, the food they consume, their culture and lifestyles and nature (Loring and Gerlach 2015; Ford et al. 2016; Delormier et al. 2017; Lamalice et al. submitted; Herrmann et al. 2020).

This shift in diet has reduced the quality of many communities' diets. Many people are consuming more store-bought foods with relatively low nutritional value and fewer nutrient-dense country foods (Huet et al. 2012; Rosol et al. 2016; Sheehy et al. 2013, 1). Schroeder and Smaldone (2015, 274) define food insecurity as 'uncertain ability or inability to procure food, inability to procure enough food, being unable to live a healthy life, and feeling unsatisfied' and identify 'three layers of food insecurity (individual, community,

society)'. In the Canadian Arctic and Provincial North, food insecurity is a chronic problem, particularly for Indigenous communities (Loring and Gerlach 2015). The 2007–2008 Inuit Health Survey of Nunavut, the Inuvialuit Settlement Region, and Nunatsiavut reported that 68.8%, 43.3%, and 45.7% of Inuit households in these communities (respectively) have a high level of food insecurity (Rosol et al. 2011, 488). The dietary transition away from local, nutrient-dense, traditional foods has major implications for the health of remote northern and Arctic communities, such as increases in the rates of obesity and cardiovascular diseases (Willows et al. 2012; Halseth 2015).

Moreover, the northern regions of Canada have become highly dependent on supplies of provisions from the corporate, globally integrated food system (Lamallice, 2019). This has eroded their food sovereignty, which is 'the right of peoples to healthy and culturally appropriate food produced through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems' as defined in the Nyéléni declaration (Vía Campesina 2007). Traditional food systems support food sovereignty (Turner and Turner 2008; Thompson et al. 2011). For Indigenous communities in the North, food sovereignty is central to food security, as the Inuit of Alaska demonstrate: Food sovereignty is represented by the handle of the traditional Inuit *qilaut*' drum, and food security is the drum itself (Inuit Circumpolar Council–Alaska 2015, 12).

To tackle food insecurity and (re)establish food sovereignty in Inuit and First Nations communities, to adapt to the food crisis and to make communities more resilient, an array of community-based food initiatives are arising all over the Canadian North. These initiatives promote access to land-based activities and to local food and knowledge of local food. They also support local food production and seek to reduce inequalities in access to a healthy diet (e.g., Papatsie et al. 2013; Delormier et al. 2017; Kenny et al. 2018; Chen and Natcher 2019). As Delormier et al. (2017, 2) note, '[...] resilient Indigenous Peoples are reclaiming their food security, nutrition, and health by revitalising their food systems in ways that privilege Indigenous worldviews, livelihoods, and governance'.

As Berkes and Ross (2013, 17) express it, 'community resilience is not only about theory; it is equally about practice: How can adaptive capacity, self-organisation and agency be supported and fostered through processes such as community development and community-based planning?' For Ford et al. (2016), such community-based adaptation initiatives require university-affiliated non-Indigenous researchers and practitioners to work 'in close collaboration with communities, in which decision-making is shared and underpinned by frequent dialogue' (Ford et al. 2016, 130). This chapter describes community-based adaptation initiatives centred on food security and food sovereignty. Two questions are of relevance: (1) What factors effectively enable community-based food initiatives to improve food security and food sovereignty? and (2) How do the communities perceive these programs?

To address these questions, this chapter will first present three specific examples from across Canada of community-based and in some cases community-led projects. In these projects, all co-authors join forces with their community partners to address food insecurity and enhance food sovereignty and thereby community resilience. The three projects considered here are: (i) the greenhouse and community gardening projects in Kuujjuaq and Kangiqsujuaq in Nunavik (province of Quebec), (ii) the clam garden restoration in the Gulf Islands region (province of British Columbia), and (iii) the country food program and Meechim farm in Garden Hill First Nation (province of Manitoba). This chapter examines how these community initiatives enhance access to affordable, nutritious food in Northern communities while also improving food security, food sovereignty, and wellbeing; maintaining Indigenous identity and culture; and preventing diet-related chronic diseases. Next, the chapter analyses the communities' perceptions of these programs. It concludes with a discussion of the synergies and trade-offs of such projects and then provides some recommendations for future food security and food sovereignty projects in Northern communities.

Indigenous communities' concerns about food security and food sovereignty

Inuit community food issues in Nunavik

Nunavik is the northernmost part of the province of Quebec. It is in Eastern Subarctic Canada, which has no land routes for vehicles. Nunavik is 443,685 km² and was established under the James Bay and Northern Quebec Agreement of 1975. The 13,188 inhabitants, of whom 89.5% are Inuit, live in 14 coastal northern villages (2016 census, Statistics Canada 2017a). Over the last 50 years, the proportion of country foods (based on subsistence land-use activities such as hunting, fishing, and gathering) consumed by Inuit in Nunavik has dropped (Blanchet and Rochette 2008). Almost exclusive consumption of imported foods poses financial and nutritional problems for families; these problems are so extreme that, according to the 2012 Aboriginal Peoples Survey, 'in Nunavut and in Nunavik, at least 55% of Inuit adults (aged 25 and over) lived in a household that experienced food insecurity' (Arriagada 2017, 1). This Westernisation of nutrition and the health problems associated with it (e.g., type 2 diabetes and obesity) particularly affect children; 49.7% of children in Nunavik face food insecurity, which increases the prevalence of anaemia and slows growth (Pirkle et al. 2014, 233).

Poverty is a major impediment to food security in Nunavik, where '37.5% of Nunavik Inuit households live in poverty' (Kativik Regional Administration 2014, 8). For families who cannot take part in subsistence activities because they lack the necessary expensive equipment such as all-terrain vehicles, snowmobiles, and boats, store-bought food is the main alternative

(Meakin and Kurvits 2009). However, grocery store prices are also a limiting factor due to high transportation and storage costs (Damman et al. 2008, Lamalice 2019). Indeed, consumer prices in Nunavik are much higher than in southern Quebec: ‘the cost of food is 52% higher than elsewhere in Québec’ (Kativik Regional Administration 2014, 8). In sum, about 44% of the income of Inuit households in Nunavik is devoted to food, compared to only 12% in the rest of the province of Quebec (Kativik Regional Administration 2014, 8).

A closely related, but often overlooked, challenge to food insecurity that has been an issue for several decades in Nunavik is food sovereignty. The growing dependence on southern food supply networks erodes the Nunavimmiut’s (the Inuit of Nunavik) control of their lands and their food system, destroying the food sovereignty that characterised the traditional Inuit food system (Lamalice 2019). The low frequency of food shipments (once a month) and the irregularity of ship arrivals due to climate hazards further weaken this already weak control. Federal food aid programs designed by southern government officials, such as Nutrition North Canada, also affect food sovereignty by outsourcing decision-making power (Lamalice 2019).

The Niqiliriniq Project (which means ‘caring for food’ in Inuktitut) was begun in 2015 in the northern villages of Kuujjuaq, the administrative capital of Nunavik, and in Kangiqsujuaq, a village 500 km north of Kuujjuaq. In Kuujjuaq, 72% of the 1,353 inhabitants identify as Inuit (2016 Census, Statistics Canada 2017b). In Kangiqsujuaq, 705 of the 750 inhabitants, or 94% of the population, self-identify as Inuit (2016 Census, Statistics Canada 2017c) (Figure 14.1).

First Nations community food challenges in northern Manitoba

First Nation communities in northern Manitoba have traditionally relied on a diet of meat, fish, and birds, along with berries and plants (Thompson et al. 2012). The merits of this diet of wild food are evident from archaeological findings of ancient Indigenous skeletons with excellent dental health and no evidence of arthritis despite advanced ages (Price 1939). Kuhnlein (2006) reports on the major pharmacologic and therapeutic benefits of wild foods, which are low in unhealthy fats, sodium, carbohydrates, and sugar but high in good-quality complete proteins and other nutrients (Batal et al. 2017). Other physiological benefits stem from the aerobic and muscle-building activities of harvesting, gathering, and preparing wild food. These foods also protect against chronic diseases such as diabetes, cancer, cardiovascular diseases, and obesity, as well as many other negative health conditions (Kuhnlein and Receveur 1996; Thompson et al. 2012; Willows et al. 2012).

Harvesting involves a complex social system requiring ceremonies, stewardship and protocols to maintain the balance between the earth and the people (Thompson, Harper and Whiteway, 2019). In the First Nation worldview, land and all life are considered a gift from the Creator; animals and plants

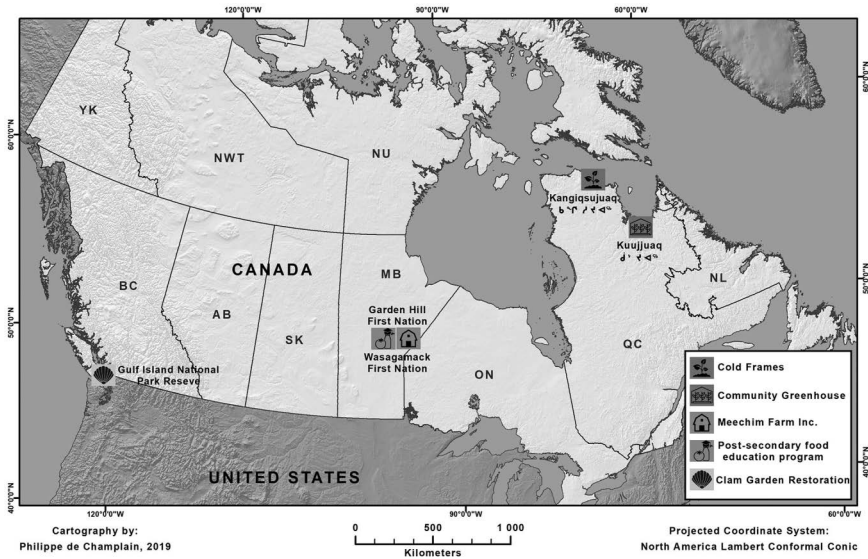


Figure 14.1 The locations of the community-led food initiatives studied here and their partner communities.

agree to sacrifice themselves for food, clothing, and housing in exchange for human stewardship of the land (Thompson, Harper and Whiteway, 2019). Spiritual practices are an important part of all cultural practices, including harvesting. These practices include ‘reciprocity’ or making an offering before the harvest; taking only what is needed; and offering a feast from the first harvest – for the spirits and all elements of the earth to celebrate (Thompson, Harper and Whiteway, 2019).

Before Canada’s colonisation by European settlers, Indigenous hunter-gatherers were nomadic. In small family units Indigenous people lived and ate off the land with in local foodsheds and in ancestral territories. Living in these smaller groups was a sustainable strategy to prevent overharvesting of any single ecosystem. All Indigenous People in Canada employed such careful practices to sustain the animal populations they relied on.

Many Indigenous People in Northern Manitoba still rely heavily on hunting and fishing. Hunting, fishing, trapping, and gathering are integral to Indigenous culture and livelihood (Kuhnlein 2006). According to the Northern Food Prices Project (NFPSC 2003), even in the late 1950s, aside from flour, sugar, and some other similar items, Northern communities relied on their own foods. But then Indigenous People experienced a radical dietary shift and began to depend more on store-bought foods than traditional foods (Batal et al. 2017). Reducing traditional food practices eventually created a vicious cycle of increased dependence on market foods and adoption of southern

food practices (Thompson et al. 2012). To make matters worse, in 1976, a hydro development megaproject intentionally flooded the O-Pipon-Na-Piwin Cree Nation (OPCN) and displaced this community. The traditional territories of many northern Manitoba Cree communities were flooded, negatively impacting many northern Manitoba Indigenous communities, displacing the OPCN community. The traditional territory of OPCN and many other Cree communities was flooded and their food shed was negatively impacted, resulting in a higher dependence on market foods (WalDRAM 1988; Thompson 2015). Market food is lower in iron, calcium, folacin, vitamins, and fibre but higher in fat and sugar than traditional foods (Willows et al. 2012; Batal et al. 2017). Northern communities that were once food self-sufficient and healthy now struggle with very high rates of food insecurity and ill health (Thompson et al. 2012). The monopoly and commodification of food by non-Indigenous corporations has made healthy food unavailable or cost prohibitive.

The nutritional transition from traditional food to store-bought food has increased the rate of chronic diseases and unhealthy lifestyles. Problems of food access in remote fly-in communities in Manitoba include a limited selection of healthy foods, high food prices, the uncertainty of travel on winter ice roads, high poverty rates, and the declining consumption of country foods (Thompson et al. 2012). Food security is highest in remote communities – 88% in Garden Hill and 86% in St. Theresa – and 100% in the flood-impacted communities of OPCN (Thompson et al. 2012). A lack of safe drinking water also impacts food safety and food security in Northern Manitoba, including in the Garden Hill, Wasagamack, and OPCN First Nation communities. Buckets of water and slop pails increase the risk of food contamination, with safe water being a requirement for hygienic food preparation (Thompson, Bonnycastle and Hill, 2020). The lack of piped water and of piped sewage, contamination of cisterns, and inadequate kitchens all present obstacles to food security (Davy 2016). Without hygienic conditions for food preparation due to a lack of plumbing and of functioning faucets, sinks, and toilets, community members are more liable to become ill. Indigenous food sovereignty requires the human right to safe drinking water and sewage services as well as greater control over land and community control of food markets.

The reinvigoration of local food production is key to food access (NFPSC 2003). Healthy foods, such as fruits and vegetables. Cost four times as much as unhealthy foods. Because of their long shelf life, junk foods are cheaper than healthy ones in Northern Manitoba. Soft drinks and potato chips do not expire quickly, so they can be brought in on winter roads and stored in isolated communities that rely on airplanes for access, as is the case for most Northern Manitoba communities. Nutrition North Canada subsidised 635,680 kg of food (worth CA\$915,275) between 1 April 2014 and 31 March 2015 for the four communities in Island Lake (Nutrition North Canada 2016) but refuses to subsidise local production, hunting, trapping, fishing, or conservation activities. Nutrition North Canada does not subsidise chicken feed,

seed potatoes, fishnets, hunting traps or gas for fishing. Farmers receive government subsidies for fuel, but fishers and hunters do not.

Policies also forbid the serving of wild foods in public venues. For example, the Garden Hill schools could not include wild foods in their school lunch programs and feasts, despite their limited budget; the local Environmental Health Inspector allowed only commercial meats and fish. In a community with high rates of poverty and unemployment, even recovering the costs of hunting and trapping is difficult, as residents may not sell wild meat or local fish (Thompson et al. 2012). Hunting and trapping can be expensive as most trap lines are located far from the community; with no possibilities to recover the costs, these activities are not economically possible for disadvantaged people in Garden Hill and other Indigenous communities.

First Nations community food challenges in the Gulf Islands

Seafood is a core component of health and culture for coastal First Nations. It nourishes the body and supports ties within communities and between the community and the land (Donatuto 2008). Although salmon often receives the most attention in research on food systems in this part of the world, clams are also extremely important to Indigenous Peoples on the Northwest Coast of North America nutritionally, culturally, and economically, and have been for as many as 11,000 years (Kuhnlein and Humphries n.d.; Deur et al. 2015; Toniello et al. 2019). Clams contain many healthy nutrients: proteins, omega-3 fatty acids, vitamin B-12, and various essential minerals (Hamed et al. 2015; Moll and Davis 2017). Traditionally, clams were a dietary staple, used during times of decreased access to or availability of other country foods. They were prepared in several ways for immediate consumption or preserved for later use (Deur et al. 2015; Kuhnlein and Humphries n.d.). Culturally, clams are revered Coast Salish communities. They are often considered an important relative as their families and social structures are similar to those of humans (Deur et al. 2015; Kuhnlein and Humphries n.d.). Clams often feature prominently in cultural stories. Furthermore, they are an essential focal component of various ceremonies and annual gatherings for Indigenous communities in this region (Donatuto 2008; Kuhnlein and Humphries n.d.). Economically, clams were also historically used for trade. They helped coastal Indigenous communities acquire resources such as berries, root vegetables, herring eggs, and eulachon oil. Following European contact, some Indigenous communities used clam gardens as an inroad into the cash economy, selling clams to help feed communities and maintain traditions (Deur et al. 2015). Today, commercial clamming is an important source of income in many Coast Salish communities (Evans et al. 2005).

There is extensive evidence that communities along the Northwest coast used clam gardens, a beach modification that involves the construction of rock walls at the lowest tide line, to improve clam habitats and support food security for at least 3,500 years (Duer et al. 2015; Smith et al. 2019).

Historically, clam gardens are thought to have been governed by a tenure system and social rules designed to maximise community benefits and health (Lepofsky and Caldwell 2013; Lepofsky et al. 2015; Moss and Wellman 2017). Their construction and maintenance created optimal habitats for clams and also strengthened social and cultural ties, food security, and economic stability (Groesbeck et al. 2014; Deur et al. 2015; Jackley et al. 2016). The use of clam gardens diminished after European contact, likely because of various factors, including population decline from epidemics and dislocation and settler government policies including residential schools, changing food options, and loss of access to traditional clamming beaches. Today, some clam gardens are still maintained and harvested while others have been unused for generations (Augustine and Dearden 2014; Deur et al. 2015).

Today, multiple First Nations are developing projects to restore and recover these ancient clam gardens. These projects support numerous goals related to food and environmental health; in addition to providing nutritious and culturally appropriate food (Groesbeck et al. 2014), they are reconnecting people to their traditional lands and practices, providing a platform for strengthening environmental education and elder-youth relationships, and creating a venue for these First Nations to assert their sovereignty and tenure in these coastal places (Clam Garden Network 2015).

Community-led initiatives for tackling food insecurity and enhancing food sovereignty: what is working?

Inuit gardening and greenhouse initiatives: the Niqiliriniq project in Nunavik

The greenhouse project in Kuujjuaq

Public consultations held in Kuujjuaq in 2010 as part of a previous research project (Avard 2015) confirmed the interest of the population in a gardening program and secured funding to launch the project. It was supported by the Northern village of Kuujjuaq; the Quebec Horticultural Council; the Quebec Ministry of Agriculture, Fisheries, and Food (MAPAQ); the Makivik Corporation; and the Kativik Regional Government (KRG). Eight greenhouse horticulture microprojects were set up. Local actors, including the Ungava Supervised Apartments, the school, and local residents, were interested in gardening. In the second year, these eight microprojects were grouped together under the Kuujjuaq Greenhouse Project. Significant progress was made that year, particularly in the compost project, which was joined by Kuujjuaq's grocery stores and restaurants, KRG, and the Ungava Supervised Apartments. The project's success led to the construction of a second greenhouse in 2012. The two buildings, both 133 m², now stand beside each other on the edge of the village. The greenhouses are divided into 46 individual garden beds, each about 4 m², which are distributed by lottery

to interested individuals or families for each annual growing season, which usually runs from mid-May to September. A crop monitoring protocol put in place by our team during the 2016 growing season showed that the greenhouses' production capacity is around 1.15 tons of vegetables, fruits, and aromatic herbs (Lamalice et al. 2018; Lamalice 2019).

Constructing cold frames in Kangiqsujuaq

With the increasing success of the Kuujjuaq community greenhouse project and with a favourable provincial climate for funding this kind of project, several northern villages in Nunavik expressed their interest in implementing their own gardening initiatives. Kangiqsujuaq was one of them, and our Niqiliriniq team organised a first visit to this community in October 2015 to meet local actors and define the project to build together (Lamalice 2019). This co-construction process took two years. Project members visited the community three more times to organise consultations and workshops on the topics of food, Northern agriculture (Lamalice 2019). During these exchanges, it was decided to start with a small, low-tech project to test the interest of the local population in gardening. The community wanted the school to be the main anchor of the project so that the youth would take ownership of this new way of producing food locally. The village also wanted to include the cultivation of traditional plants to increase their presence in the village and to promote the transmission of knowledge related to this traditional food source.

In August and September 2017, Arsaniq school classes participated in the construction of four cold frames (unheated wooden frames with a glass top used to protect seedlings and plants from the wind) (Lamalice, 2019). In summer 2018, after multiple visits and workshops, the four cold frames were installed in different locations in the village: at the town hall building (Northern Village), the clinic, the Elder house, and the Landholding corporation. This made it possible to study the effect of location on plant growth. The cold frames contained different soil mixes to test the quality of soil and the possibility of using the local substrate (i.e., a compost–peat–black soil mix and a black soil–seaweed–compost mix). An employee at the associated institution was in charge of managing each cold frame. Based on the cold-frame managers' interests and the climate conditions, different types of edible plants were grown in each frame: leafy and root vegetables (e.g., lettuce, carrots, and spinach), aromatic herbs (e.g., chives and parsley), and local berries and plants (*Empetrum nigrum*, *Vaccinium vitis-idaea*, *Rhodiola rosea*, and *Oxyria digyna*) (Figure 14.2a–d). The cold frame containing local plants was installed at the Elder's house. Our Inuit partners call the cold frames *Pirursiivik*, 'a place to grow stuff' in Inuktitut or 'big boxes'. Due to the very short growing season, several plants were started in the Kuujjuaq Greenhouse before being transplanted to the cold frames in Kangiqsujuaq. This collaboration provided significant support for the first year of the Kangiqsujuaq project.



Figure 14.2 Cold frames in Kangiqsujuaq. (a) Constructing cold frames; (b) Planting cold frames; (c) Cold frame with root vegetables and aromatic herbs in front of the municipality; (d) Cold frames with traditional plants in front of the Elders' house. (Photo credits: Marion Macé 2018.)

Building local capacity: community gardening, nutrition, and cooking workshops

With the goal of building interest in and technical knowledge of food gardening, multiple hands-on workshops were offered during winter 2018 in Kangiqsujuaq and Kuujjuaq (Lamalice 2019). The researchers from the Niqiliriniq project and managers of different local institutions (e.g., the town hall, the school, and the Elder house) organised a wide variety of workshops on different aspects of nutrition, including growing, harvesting, and cooking healthy, culturally relevant food. Participants in yearlong indoor food gardening workshops grew sprouts, microgreens, aromatic herbs, and local plants (e.g., *Qunguliq* [*Oxyria digyna*], mountain sorrel in English). These



Figure 14.3 Gardening workshops and creating interactive maps of gardening activities. (a) Monitoring Qunguliq (*Oxyria digyna*) at the Makivik Corporation in Kuujjuaq; (b) Kangiqsujuaq municipal staff members learn how to grow aromatic herbs, spices, and vegetables at the Nasivik adult education centre in Kangiqsujuaq; (c) Screenshot of *Niqit Piruurtut* – an interactive online map of local gardening and greenhouse initiatives in Kangiqsujuaq and Kuujjuaq (Macé 2018). (Photo credits: Marion Macé.)

plants can be grown at home and can represent a significant source of nutrients and fresh food. Cooking and nutrition workshops were also offered to school students and the public in order to build awareness of balanced diets and micronutrients (Figure 14.3a–c).

The multiple workshops offered during the winter preceding the first growing season in Kangiqsujuaq played an important role in teaching local residents about the possibilities of growing food at home. Starting with simple, short-growth plants such as sprouts, microgreens, and aromatic herbs allowed participants of different ages to increase their interest in and

technical knowledge of indoor food gardening. At the end of the workshops, several participants expressed interest in getting personally involved with the cold frame food-growing project.

Regular updates about the project were widely shared with communities via social media, community radio, and direct communication. Technical documentation and knowledge sharing tools (e.g., a step-by-step compost guide and a step-by-step greenhouse guide) were produced to support the management and development of the initiative but also to encourage full local ownership of the project. These actions helped bring a wide range of local people on board; some of them became long-term leaders ('local champions') of the food gardening project in their respective communities.

Interactive online maps of food habits: telling my food story

Inuit culture is deeply rooted in oral tradition, in stories that relate every day, historical, mythical, or personal experiences. All these stories have a spatial dimension. Interactive, dynamic story mapping (Caquard and Cartwright 2014; Caquard and Joliveau 2016) is an emerging approach to better understand the relationships among individuals, communities, and the environment. This project used online mapping applications, particularly the StoryMap JS platform developed by Northwestern University Knight Lab,¹ to map the stories of Inuit youth in Kuujjuaq and Kangiqsujuaq related to food sources and locations of food supplies. This cartographic platform is closely related to the ESRI Story Maps software. In their comparative analysis of the main applications for online narrative mapping, Caquard and Dimitrovias (2017, 10) call the ESRI Story Maps software well suited for

[...] the representation of travel stories or documentary stories in which places and journeys are clearly identified. [...] ESRI Story Maps offer the ability [...] to design maps collaboratively, to represent different stories on the same map [...] and to distinguish graphically different links between places.²

The youth received training on StoryMap JS (e.g., how to organise information in a map, how to import matrix and vector data, and how to link different media such as photos or videos with a point), they produced – individually or in groups – personal interactive narrative food maps online (for a detailed description, see Macé 2018). These interactive narrative maps are thus the tangible link between the oral narratives and the current role of the land as a food provider for the Nunavimmiut (Figure 14.4a). Different types of narrative spaces that characterise these 'feeding landscapes' can be identified on the story maps:

- Places are mentioned frequently: 'I often go to the co-op to buy pork chops' (a young Inuk from Quaqtq 2018).

- Specific locations are mentioned, including local supermarkets such as the Newviq'vi/Tullik or Northern Store in Kuujjuaq; for example: The 'community freezer [a communal refrigerated storage space; most of the time Hunters sells their harvested traditional food to the hunter support which donate it to the community] is where I get my wild food, like Arctic char' (StoryMap of a young Inuk from Quaqtaq 2018).
- Narrators provide precise, detailed geographical descriptions of some places: 'Roberts Lake (Tasirjuakuluk) is where we fish for lake trout and landlock char (Nutilliq)' (StoryMap of a young Inuk from Quaqtaq 2018).
- Other places are described in general terms: 'On the land. Ptarmigan. You chase it for six hours in a skidoo' (StoryMap of students at Kuujjuaq High School 2018).

The digital story maps show specific places (e.g., hunting routes) and items (e.g., food species) but also integrate local Inuit knowledge as well as the emotions and cultural relationships that Nunavimmiut associate with particular places and that mark the land as a provider of food. Hence, these maps are a spatiotemporal analytical tool that can clarify the different forms of lived and perceived spaces that structure narratives about foodscapes (on this topic, see also Lamalice et al. submitted). The narrative interactive maps helped engage youth in discussions about their representation of contemporary Inuit food systems (Macé 2018, 55).

Niqit piruurtut: creating interactive, dynamic online maps of local food initiatives in Kangiqsujuaq and Kuujjuaq

Free and open source geospatial software allows new forms of dynamic and interactive cartography to be created online and promotes citizen science (Kar et al. 2016). Inuit communities are increasingly using new GeoWeb mapping tools to monitor their communities (e.g., Inuit Sea Ice Knowledge and Use <http://sikatlas.ca/index.html>; Inuit Trails Atlas <http://paninuittrails.org>). In the Niqiliriniq project, the open-source platform uMap was used to create an interactive online map showing the progress of local gardening and greenhouse initiatives in Kangiqsujuaq and Kuujjuaq (for a detailed description, see Macé 2018). Multimedia data (photos, videos, and oral testimonies) shared by local gardeners were incorporated into the map and associated with the locations where they took place (Macé 2018, 56). Since the mapping platform is online, local villagers could easily update it to reflect the progress of each initiative and could use it as a community-based monitoring tool (Macé 2018, 55). The interactive features of the Niqit Piruurtut map combined with multimedia content helped residents and decision makers in Kuujjuaq and Kangiqsujuaq understand different aspects of the local gardening initiatives (Fig. 3d) (see also Laurini 2004; Joliveau 2011). This interactive map can also be used as a reference tool in both municipalities

for land use planning as well as for decision-making in regional governmental institutions such as the Kativik Regional Government or the Makivik Corporation.

The StoryMap JS platform was also used to create an interactive atlas of all Northern community-based food gardening initiatives in the Canadian Arctic and Subarctic. Developed at the request of the Kuujuaumiut, this atlas is a knowledge-sharing platform. It provides key information and links to relevant contacts, websites, or social media pages, and publications associated with gardening projects. The map was embedded into the website developed by the Niqiliriniq project researchers dedicated to sharing information related to Northern agriculture (<https://www.polarharvest.com/en/cartographie-interactive/>) (Lamalice 2019).

Community-led food initiatives in northern Manitoba

Community-based food action is an important way to tackle food insecurity (Thompson et al. 2014). A 2012 survey of 14 First Nation northern Manitoba communities determined that communities with country foods programs led by First Nations were more food security (Thompson et al. 2012). Thompson et al. (2012) credit the country food program in the remote northern Manitoba community of Nelson House First Nation with significantly improving food security there, as well as increasing other livelihood assets, including natural and social assets (Thompson et al. 2012). Country food programs encourage residents to share traditional food resources (wild food and garden produce) rather than depending on the market system. OPCN and many other flood-impacted communities in northern Manitoba have also developed country food programs (Thompson and Pritty, 2020).

Through focus groups the priorities in northern Manitoba were found to be promoting traditional knowledge about hunting, trapping, and gathering food in school programs. Another priority was to provide funding for residents to obtain boats/motors, skidoos, or gas so they can engage in traditional activities. This connection to the land and stewardship of the land is considered a sacred trust and is important for cultural identity. Communities can create Indigenous food systems by building community gardens, implementing country food programs, providing education about the land, and establishing farms, stores, and restaurants that provide healthy and affordable food as well as jobs for local people.

In OPCN 90% of 87 families surveyed agreed that there was a need for a community store; 10% were satisfied with the Northern Store, the corporation that has a monopoly on supermarkets (Thompson and Pritty, 2020). To meet this need, a pop-up community-run market was trialled in 2016; this market offered good, healthy food at affordable prices. Pop-up markets only opened on days that community members received social assistance and family assistance pay and were very popular. This trial demonstrated that local stores present a real alternative to the Northern Store.

OPCN, and other remote and rural First Nation communities, would benefit from something similar to the Outback stores, which were funded by the Australian government but owned by remote Indigenous communities. These food stores provided access to nutritious food and developed local economies (Davy 2016). In contrast, the Canadian government supports a corporate, non-Indigenous monopoly, the Northern Store, which competes with non-subsidised local food production and local stores (Thompson et al. 2012).

Post-secondary education to teach Indigenous food systems has been identified as a powerful way to encourage young people to tackle food issues in their communities. This community-led applied education program would also improve food security by engaging youth in fishing, hunting, gardening and managing community grocery stores. Meechim Farm, Inc., a community enterprise in Northern Manitoba, employs and trains 15 young people every summer. This farm began hiring young people in 2015 and (at this writing) is still the only farm in in the many First Nations on the East-side of Lake Manitoba to do so (Thompson et al. 2014). The farm's goal is to improve food security, train young people, and build sustainable livelihoods. This community-owned social enterprise also runs a pop-up store that sells healthy imported food as well as local food. The farm is run by a manager and offers employment training and mentorship programs for youth and unemployed people. Young interns are hired and trained to cultivate, produce, harvest, process local food and sell local food.

Garden Hill and Wasagamack First Nations have identified a need for post-secondary education in Indigenous food systems. Better training and advanced education are needed to effectively reduce food insecurity and build local food systems (e.g., food stores, farms, country food programs, and traditional camps). Communities need agroecology education as well as knowledge of traditional medicine and skills in fishing, hunting, gathering and preparing food. The Mino Bimaadiziwin partnership is currently developing a curriculum for providing community-led to offer post-secondary education for communities to grow, harvest and sell local food using a train-the-trainer model. Colonial systems have impoverished northern Manitoba communities by creating reserves as economic dead zones and then underfunding education and training programs. At present, to be sustainable, local food educational programs must dip into several meagre pots of government funding, in the different sectors of education, employment training, and community development. The applied education program will create and increase the capacity of local businesses (e.g., grocery stores, restaurants, and commercial fisheries) (Figure 14.4a–d). By harvesting food locally from their vast traditional territory, First Nations steward and protect their land.

According to the people of Island Lake, the land is perfect as it is. They do not want any new developments that would interfere with traditional land uses, such as hunting, gathering, fishing, and traditional ceremonies



Figure 14.4 Local food initiatives in northern Manitoba. (a) O-Pipon-Na-Piwin Cree Nation (OPCN) country food coordinator, John Bonner; (b) Meechim, Inc. Healthy Food Market in Garden Hill with local and imported food, run by the community on welfare and paydays; (c) Youth centre educational gardens are fertilised with fish guts; (d) Meechim Farm poultry and acres of land. (Photo credits: Shirley Thompson.)

(Thompson et al. 2019). Many people in Red Sucker Lake FN, Garden Hill FN, and Wasagamack FN created map biographies to demonstrate how fully they use their ancestral land for traditional activities. For example, 49 active Indigenous harvesters in Wasagamack FN created map biographies that explore the locations where wild food is found in traditional land use mapping (a summary map is provided in Figure 14.5). According to this traditional land-use study, the community's foodshed is approximately 13,378 km² (Figure 14.6).

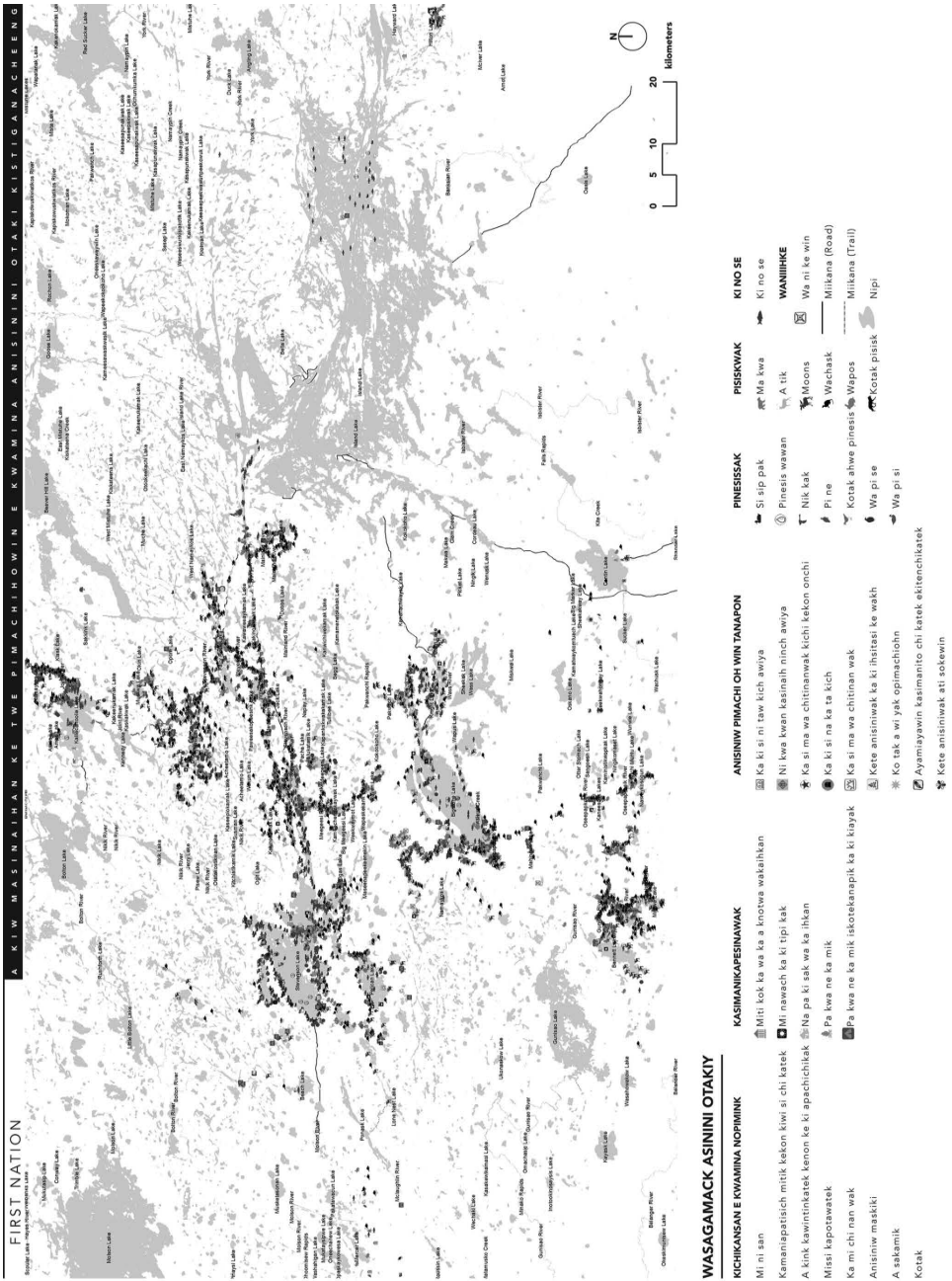


Figure 14.5 Map of food harvesting and other traditional land uses for Wasagamack First Nation.

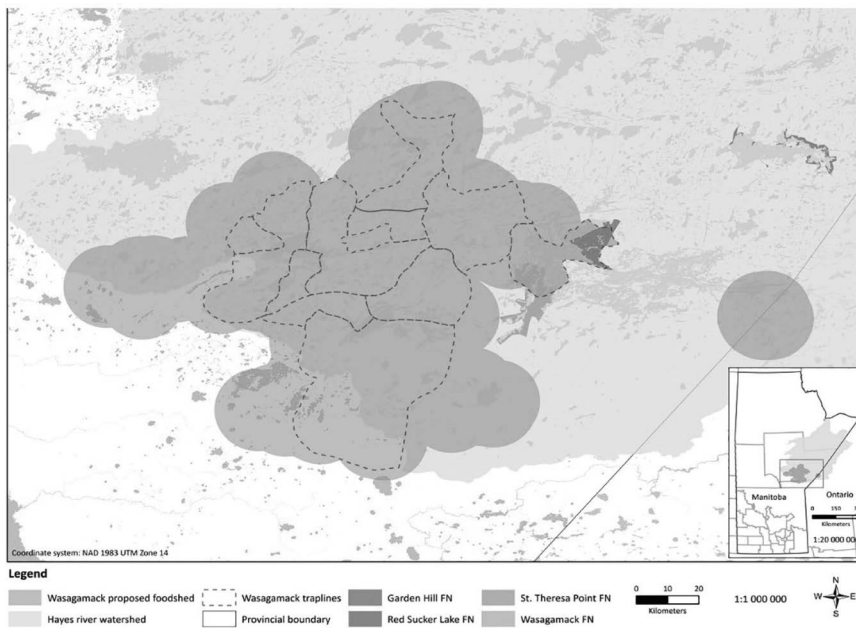


Figure 14.6 Map of the foodshed of Wasagmack First Nation.

First Nations new mariculture initiatives in coastal British Columbia: clam garden restoration in the Gulf Islands region

One program by First Nations in Canada that could offer a template for building community food security is the clam garden restoration project in the Gulf Islands region of British Columbia. Clam gardens are a beach modification that coastal Indigenous Peoples have created and maintained for over 1,500 years to increase shellfish production and harvest (Clam Gardens n.d.; Harper et al. 1995; Augustine and Dearden 2014; Deur et al. 2015). They are found in the Pacific Northwest region of North America, from Washington to Alaska. They are usually constructed in semi-protected inlets by building a rock wall at the low tide line across a bay or cove. The rock walls encourage sand deposits on the landward side, creating a gradually sloping beach terrace that is ideal for clams (Figure 14.7a, b) (Clam Gardens n.d.; Harper et al. 1995; Augustine and Dearden 2014; Groesbeck et al. 2014; Deur et al. 2015; Lepofsky et al. 2015; Jackley et al. 2016; Moss and Wellman 2017). To maintain clam gardens, large clams are harvested; the sediment is aerating with a digging stick and by rolling rocks; new or uncovered rocks and large clam shells are removed; gravel and crushed clam shells are added; and the garden is protected from competitors and predators (Augustine and Dearden 2014; Groesbeck et al. 2014; Deur et al. 2015).



Figure 14.7 Clam gardens (a) Harvesting clams; (b) Clam garden. (Photo credits: Philip Loring.)

Currently, only a handful of communities are actively working to reclaim and restore clam beaches. One such project offers valuable insights into how to link food security, ecosystem restoration, and community health and wellbeing. This project is located in the Gulf Islands National Park Reserve (GINPR) and is a collaborative initiative of Parks Canada and multiple local First Nations, including the Hul'qumi'num Treaty Group (HTG) and the WSÁNEĆ First Nations. These groups are restoring multiple historical clam gardens as a part of a multifaceted project. The goal of the project is to determine whether traditional marine stewardship practices can support better habitats for shellfish in the GINPR while simultaneously strengthening Indigenous food security and cultural practices (Boueitch 2016). Specifically, the project aims, among other goals, to: (1) create an opportunity for local First Nations people to reconnect with traditional activities and sites of cultural significance, (2) use traditional knowledge and Western science to evaluate the efficacy of traditional beach management, and (3) increase the access of local First Nations to traditional foods. The project was initiated in 2013 after years of consultation among Parks Canada and multiple First Nations. It is an example of community-directed ecological stewardship that seeks to support food security, coastal biodiversity,

heritage reclamation, self-governance, and the health of communities and ecosystems (Lepofsky et al. 2015).

Considering the significance of clams to coastal Indigenous peoples, clam gardens are important. They increase clam productivity and the ease of clam harvests while simultaneously providing human health benefits on individual, social, and community levels (Groesbeck et al. 2014; Deur et al. 2015). On the individual level, the construction, maintenance, and harvesting of the gardens supports physically active lifestyles and connections with the land. Activities include walking on the beaches, digging clams, moving rocks, building the rock wall, and aerating the soil (Deur et al. 2015). Socially, the gardens become a forum for intergenerational sharing of cultural practices, language development, and socialisation. Elders and youth work together in the gardens, building relationships in the process (Augustine and Dearden 2014). On the community level, clam gardens may prove to be an important source of food, strengthening food security (Groesbeck et al. 2014). Community control over clam garden activities also supports sovereignty and self-determination, which have been identified as critical factors in Indigenous health. They also support reconciliation (Tsosie 2007; CSDH 2007; TRC n.d; Fleming 2019).

Clam gardens could also add resilience to local and regional food systems. Generally, country food systems rely on a portfolio of primary and secondary food resources (Loring and Gerlach 2009). This portfolio allows people to respond to changing environmental circumstances and also be flexible with the changing seasons (Kofinas et al. 2011). Clam gardens increase clam production and possibly allow clams to be produced in areas that they would not naturally. Therefore, they could be key contributors to the resilience of First Nations' food systems in the future.

Insights from the Clam Garden Project could be relevant to other projects for improving community food systems in the North. Three aspects in particular stand out. First, the project explicitly seeks to link human and environmental health. Clam gardens promote positive health outcomes for people (as described above). But the gardens and beach stewardship also improve beach health. For example, the rock walls promote biodiverse life in the intertidal zone. Second, the project seeks not just to produce food but to use the gardens as a platform to connect people. At the gardens, youth interact with Elders and also with each other in a new, positive context. Third, the clam gardens have symbolic value for reconciliation and tribal sovereignty. They are a venue in which First Nations people can reassert their right to territory and their capacity to be effective stewards of the land. These linked biophysical, ecological, psychosocial, and political dimensions arguably make clam gardens a durable, resilient, and effective food security intervention that addresses not just diets but all of the many ways that food can be central to our lives and societies (for a detailed description on Clam Garden Project impacts see also Fleming 2019).

Challenges and constraints of community-based food initiatives

Technological challenges

Nunavik's communities, like other Arctic communities, rely heavily on diesel-powered generators for energy (Cherniak et al. 2015). Due to this dependence on fossil fuels, remote communities are more vulnerable to global market variations or shortages in diesel and to emissions of greenhouse gases and pollutants. Hydro Quebec (2013, 47) estimates that the electricity demand of the 14 Nunavik communities will increase by 2.9% per year from 2013 to 2023 due to anticipated population growth. Despite the availability of wind and hydroelectricity resources near these communities, renewable energy installations are still absent from Nunavik. One main challenge to implementing greenhouse technology in the Arctic is ensuring that greenhouse projects do not threaten energy and water security. The Kuujjuaq greenhouse has no heating system and operates only during spring and summer, from May to September. Technical solutions and greenhouse energy optimisations are currently being investigated to enable the Kuujjuaq Greenhouse to extend the growing season and remain energy efficient, such as the installation of a thermal storage system (Lamalice et al. 2018, 335; Blangy et al. 2018, 318).

Other renewable-energy food growing installations have recently opened in Kuujjuaq. The Kuujjuaq Hydroponic Container runs since December 2018. This is the first year-round commercial gardening initiative in this northern village. It also functions as a waste-to-energy plant and is equipped with a waste oil heating system (Makivik Society 2018).

Another key limitation to local food production in the Canadian Arctic is the absence of nutrient-rich growth substrate. This was an issue for the cold frame initiative in Kangiqsujuaq. However, many locally available components can be used to produce nutritious, 'class-A' soil for agricultural use via composting. Local resources with significant potential as organic waste in Nunavik include kelp seaweed and other macroalgae (Sharp et al. 2008); wood waste from construction projects; post-consumer waste (e.g., households, grocery stores); sand, clay and silt from riverbeds. It would be interesting to test the potential of composting technology and different soil mixes in the future growing season.

Challenges to participatory interactive web-based cartography such as the Niqit Piruurtut map include a lack of access to computers and limited access to a reliable Internet connection in the North (Macé 2018, 59).

Environmental risks

Technological challenges are one barrier to implementing programs such as the ones described in this chapter. Environmental hazards are another. For

example, First Nations mariculture initiatives, such as the clam garden restoration, can increase communities' risk of exposure to ocean acidification, harmful algal blooms, other environmental contamination such as paralytic shellfish poisoning (Fleming 2019).

Lack of knowledge and training; merging different types of expertise

One barrier to the food growing project was a lack of prior knowledge about farming or gardening in a greenhouse setting. Vocational schools in Nunavik offer no training in horticulture or agriculture. Here, the post-secondary education program in food developed by Wasagamack FN and Garden Hill FN can serve as an example for the development of agricultural skills.

Most greenhouses in the Arctic today use a container-like architecture or are arenas transformed into greenhouses. Local traditional knowledge then becomes important; ideally, greenhouses should merge traditional ways of storing food such as semi-subterranean dwellings (e.g., Qarmaq, Yupik house, Qaggi) with modern greenhouse designs to develop culturally appropriate greenhouses (Laurendeau 2018, 18).

Organisational challenges

Skinner et al. (2014, 8) studied the greenhouse at Fort Albany First Nation and described the challenges around ownership. Several community members did not think of the greenhouse as a communal structure that belonged to everyone. Similarly, Chen and Natcher (2019, 150) highlight the challenges of managing local greenhouses in relation to the ethnic and socioeconomic background of the local participants. They pose a question:

[...] are participants in community gardens and greenhouses those most in need or do they represent a more transient population (e.g., school-teachers or government employees) who are either accustomed to having regular access to fresh foods or are drawn to the company of others with similar socio-economic standing? If the latter, participation in community gardens and greenhouses could be viewed negatively by permanent community members, or even considered elitist and used only by those who can afford membership (e.g., membership and plot fees) and have flexible schedules to volunteer their time. This situation could then result in those who are most vulnerable to food insecurity being excluded from any potential benefits.

(Chen and Natcher 2019, 150)

Participation varies at the Kuujjuaq greenhouses; 46 individual lots are allocated by lottery to individuals or families interested in gardening for the annual growing season.

Tables 14.1a–c overviews the different priorities and expectations of local stakeholders and the outcomes of the food growing initiatives considered in this chapter.

Table 14.1 Community members' expectations and outcomes for the three different initiatives studied (a) The Niqiliriniq project; (b) Community-led food initiatives in northern Manitoba; (c) Clam garden restoration project

Niqiliriniq project

Short-term expectations

- Start with a small, low-tech project
=> *'We need to test the community's interest towards gardening' (resident of Kangiqsujuaq)*
- Learn to garden
=> *'It's complicated, someone needs to teach us' (resident of Kuujjuaq)*
- Involve the youth
=> *'To teach children how to grow own food plants' (resident of Kuujjuaq)*
- Include local plants
=> *'Would be nice to have berries in the village' (resident of Kangiqsujuaq)*
- Have a pleasant pastime
=> *'It would give people something to do' (resident of Kuujjuaq)*

Long-term expectations

- Local capacity building and empowerment
- Embellish the village with gardening and landscaping project
- Opportunity to have a small greenhouse at home
=> *"Individual projects at home would be great, even inside the house" (resident of Kangiqsujuaq)*
- Secure the supply of fresh fruits, vegetables and herbs year-round
=> *'Fruits are missed very much during the winter' (resident of Kangiqsujuaq)*
- Improve health and well-being
- Save some money
=> *'Veggies and fruits are too expensive' (resident of Kuujjuaq)*

Realised outcomes

- The project started with cold frames which are light, inexpensive, and easy to repair structures
- 29 gardening workshops between 2016 and 2018
- Cold frames were built with grade 3 to 5 high school students and many gardening activities were held with students of all ages as well as day-care children
- Crowberry, lingonberry and mountain sorrel were planted in the cold frames
- Most of the participants from the 2018 growing season enjoyed it and asked for more cold frames for next spring

Partially realised outcomes

- Participation of a local leader in a regional meeting on greenhouse agriculture
- Landscaping proposition was designed by a Niqiliriniq team member and will be presented to the community in 2019

(Continued)

Community-led food initiatives in northern Manitoba

Short-term expectations

- Provide youth opportunities to garden and farm to produce food for the community
- Provide some educational opportunities in elementary and secondary school regarding country foods and gardening

Long-term expectations.

- Develop community store for selling affordable foods as well as nets and materials to get country foods
- Developing a post-secondary Indigenous food system which includes hunting, fishing, gathering, cooking, food-business, food safety, gardening, animal raising, and starts businesses in other areas (e.g., community store, local restaurant).
- Starting a local restaurant or canteen selling some wild foods (fish, Labrador tea, etc.)

Realised outcomes

- Realised a community pop-up store of healthy reasonably priced food at Garden Hill, Wasagamack, and OPCN that sells once or twice per month
- Developed a permaculture design with community to expand farm over 20 years in Garden Hill
- Country food programs provide food for elders at OPCN
- Developed a farm that employs 15 people and farms 999 poultry

Partially realised outcomes

- Improved food security slightly through country foods, farming, and pop-up stores
- Jobs for youth in food production at Meechim Farm
- Some income from food production
- Growing sustainable food businesses
- Mino Bimaadiziwin committed to start post-secondary food program

*Clam garden restoration in the Gulf Islands region*³

Short-term expectations

- Restore two clam garden sites according to the traditional practices of Hul'q'umi'num and WSÁNEĆ peoples.
- Create opportunities for elders and youth to connect through beach restoration activities
- Determine whether clam gardens can be used as an effective resource management tool in the region

Long-term expectations

- Improve ecosystem health in intertidal zone
- Build community food security
- Facilitate opportunities for Coast Salish peoples to engage with their ancestral territories and practice their traditional harvesting rights

Realised outcomes

- Multiple years of beach restoration activities in summer and winter months, including elders, youth, clam experts, and research scientists
- Science and culture camps are held each year in association with beach restoration activities

Partially realised outcomes

- Increased awareness of beach stewardship and cultivation by First Nations through knowledge mobilisation that includes news articles and short documentary videos, e.g., <https://youtu.be/j2wPVx4sCN0>
-

Conclusion

This chapter adds to the growing body of literature providing empirical support for local strategies to enhance food security and sovereignty in remote communities across the Canadian North.

The study cases presented and analysed in this chapter – the Kuujuaq greenhouse, Kangiqsujuaq cold frames, the Meechim Farm, and the Clam garden project – show that community agriculture initiatives and initiatives to restore traditional mariculture systems offer valuable alternatives to the unsustainable import of nutrient-poor foods to markets in Canada's North. These local food procurement strategies provide local access to fresh, nutritious, affordable foods. They effectively reduce food insecurity and build or rebuild local food systems where communities of First Nation and Inuit food growers and farmers are exercising increased control over their food systems and the socioecological aspects of food production. This reinforces food sovereignty and creates economic opportunities in local food production. Our results corroborate earlier findings (e.g., Allan 2014; Skinner et al. 2014) that the benefits of community gardens, farms, and greenhouses go beyond their capacity to produce food and to increase consumption of healthy food. They also provide community social services. The community food initiatives described in this chapter are examples of fruitful collaborations between First Nations/Inuit communities and university-affiliated researchers or government agencies (i.e., Parks Canada) that meet the food needs identified by local Northern residents.

However, as shown by our case studies, community growing initiatives in the North still face several challenges. These include costs, technological challenges, organisational and management challenges, sustainability, and ownership.

Clearly, local food production alone cannot solve all the food-related issues Northerners are facing today. Food insecurity in the North requires effective policy responses that tackle the root causes of food insecurity (e.g., poverty, the abnormally high cost of imported foods, the colonial legacy, environmental factors, the export of food decisions to the South). Nonetheless, community food initiatives like those presented in this chapter are part of the solution. They are an important piece of the puzzle on the path toward true food security and sovereignty in the North.

Several recommendations for community projects targeting food security and sovereignty in remote communities emerge from our study:

- 1 A range of strategies allows better access to all types of food (country food, market food, locally produced food) and empowers local communities to gain control over their food systems.
- 2 Empowering governance and policies are needed to help communities navigate economic and natural resource development.
- 3 Arctic and First Nation food innovation and collaboration is needed; examples of collaboration include the UArctic program and the Mino Bimaadiziwin partnership.

- 4 Existing local knowledge should be used in food initiatives. For example, traditional food storage methods can be merged with modern greenhouse designs to develop a culturally appropriate greenhouse.
- 5 Community-led post-secondary programs on Indigenous food sovereignty should be created to develop local capacity throughout the food system.
- 6 The development of community-led education programs on Indigenous food sovereignty for young people provides them with new skills and experiences.
- 7 Community-level champions should be identified and supported. These are community members who are interested in leading local actions around food systems and who can clearly communicate about these actions and engage other community members.
- 8 More long-term funding should be allocated to community food programs.
- 9 Programs that offer training and support for raising animals should be developed and implemented in Northern communities that are starting to farm to provide assistance and supports for animal husbandry and food production.

Ultimately, the case studies examined in this chapter provide examples for other community-led initiatives.

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Notes

1 <https://knightlab.northwestern.edu/about/>.

2 Translation by the authors; original French passage (Caquard and Dimitrovas 2017, 10):

[...] la représentation de récits de voyages ou de récits documentaires dans lesquels les lieux et trajets sont clairement identifiés. [...] ESRI Story Maps offrent la possibilité d’importer des fichiers shapefile, [...], de concevoir les cartes de manière collaborative, de représenter différentes histoires sur une même carte [...] et de distinguer graphiquement différents types de liens entre les lieux. [...]

3 Note this is not intended as a comprehensive list of goals as represented by project partners, but instead a cross section of such goals as observed by Loring.

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