

UiT

THE ARCTIC  
UNIVERSITY  
OF NORWAY

Faculty of Humanities, Social Sciences and Education

## From Community Gardens to Hybrid Hydroponics:

*The evolution of northern greenhouses and Arctic gardening*

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*Master thesis in Governance and Entrepreneurship in Northern and Indigenous Areas  
May 2019*





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*May 2019*

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Cover page: Inside the Kuujjuaq greenhouse. Picture taken by: Saara Sipola

*To my son, Uljas Qusoraq, the one who speaks with the ravens.*

*Erinnut, Uljas Qusoqqamut, Tulukkanik oqaloqateqarsinnaasumut.*



## Acknowledgements

It has been a long journey to get here, in geography, learning and time. Four years as a GENI student has taken me to such a beautiful and diverse towns and communities in the North: Narsaq, Qaqortoq, Upernaviarsuk, Nuuk, Reykjavik, Akureyri, Saskatoon, Bodø, Karasjohka, Guovdageaidnu, Nesseby, Tana, Kirkenes and Kuujuuaq.

These places have not only left me with a sense of specific spaces, the tundra abundant of *Rhododendron groenlandicum*, the sound of cracking ice in Greenland, the rain and wind in Iceland balanced with the warmth of heitur pottur, or of a region where Sámi, Norwegian, Finnish and Russian influences meet and mingle.

Within each, there are vivid memories of people who have contributed on my thesis but also encouraged me to carry on. These encounters have been a source of joy and gratitude, still felt.

I am grateful for the Arctic University of Norway – University of Tromsø and University of Saskatchewan for welcoming me as student in 2015. For the Faculty of Humanities, Social Sciences and Education for a grant to join a UiT delegation to Iceland and particularly, to my home institution Center for Sámi Studies for financial support. My gratitude in all academic issues goes to Else Grete Broderstad, Jonathan Crossen, Rachel Issa Djesa and Hildegunn Bruland. Thank you for always being available and making me feel welcomed.

Deatra Walsh, without your guidance and supervision I would simply not have made it.





## Abstract

The past and current connections between indigenous peoples and global food production is complicated and multi-dimensional. Agro-ecology and sustainability, as strategies to alleviate global food production problems and, in this case, food insecurity, are consistent with indigenous communities' traditional food harvesting practices. Historically, their sustainable food systems and culinary traditions have embodied the very essence of sustainability, millennia before it became “invented” by the mainstream societies (Oskal et al. 2018; Egede, 1998). In this context, Northern greenhouse development and Arctic gardening emerge as viable solutions toward addressing food insecurity, retaining food sovereignty, and creating opportunities for development.

The aim of my thesis is to illustrate the importance of local food systems for indigenous peoples, and the efforts undertaken so far, to address food security and regional development in the North. My work looks at the intersection of food security and development through an examination of the evolution of Arctic gardening in the Arctic, with a focus on Nunavik, one of the four regions of Inuit Nunangat in Canada. More specifically, I look to the community of Kuujjuaq, located in Nunavik. Using secondary, published data, and primary source data, including interviews and participant observation, I address the following research questions in this thesis: *What impacts can be identified from the development of community gardens and greenhouses in the North and how can gardening contribute to increased food security?*



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# 1 INTRODUCTION

Northern greenhouse development and Arctic gardening has emerged to a level recognized throughout the circumpolar north; it has drawn interest from scientists, government officials and community residents alike (Avard, 2015; Agriteam Canada, 2013; Skinner et al. 2014; Chen & Natcher, 2019). Research of northern greenhouses and gardening over the past 20 years reveals nearly universally progressive and positive results in northern communities, including Upernaviarsuk in South Greenland, Inuvik in Northwest Territories and Kuujuaq in Northern Quebec (See: Inuvik Community Greenhouse, 2018; Allen, 2014; Fieldhouse & Thompson, 2012; Doucette et al. 2014). This interest has brought forward new sources for funding, further adoption of science and technology, in addition to community capacity building (Lamalice et al. 2018). Despite these rather recent *active* efforts of growing food in the north, the idea and practice is nothing new. For nearly a century, or longer, local indigenous and non-indigenous residents, small groups of scientists and settlers experimented with a variety of crops in the Arctic and sub-Arctic regions (Stevenson et al. 2014; Loring & Gerlach, 2010).

The reasons for a ‘northern gardening boom’ are many. For one, the climate is changing. Arctic temperatures over the past 100 years have increased at almost twice the global average (Stevenson et al. 2014; Nobel, 2013). This has already had an extensive impact on the Arctic, particularly on the migration routes of the animals, changes in sea ice, permafrost and snow cover, but also on extending the growing season with expected positive impact on agriculture (Loring et al. 2015; Hovelsrud et al. 2011). In addition, long distances from many northern communities to food production and distribution centers, and the need to import most of the consumed food, doubles the northern prices relative to what southerners pay for their weekly food basket (PROOF, 2019).

Much of the Canadian North is food insecure (Public Policy Forum, 2015). Food insecurity is defined as whenever the availability of nutritionally adequate and safe foods or the

ability to acquire acceptable foods in socially acceptable ways is limited or uncertain (Hamelin et al. 2012). Food insecurity for Inuit, the Indigenous peoples of the Arctic, is the highest among Indigenous populations (Council of Canadian Academies, 2014). A recent study of household data from the Canadian northern territory of Nunavut, with a population of over 85% Inuit, reveals a household food insecurity rate of 47 percent (Fafard St-Germain et al. 2019). Inuit specific health data, while arguably dated, suggests that one in seven Inuit children are food insecure (Ibid.). However, indigenous people's food security is a more complex issue than this. The impact of colonialism, followed by a change of diets and lifestyles in indigenous regions along with social and economic inequality, contributes to the situation of food insecurity. Historically, indigenous people's food security was connected to the land and its productivity. People functioned within systematic and sustainable food systems, although hunger and famine did occur at times (Oskal et al. 2018; Larsen & Oldenburg, 2000). In Canada, the *Indian Act*, the establishment of reserves for indigenous people, and the introduction of the residential school system—which effectively separated families and displaced children—disrupted food-harvesting practices and the knowledge required to undertake them (Thompson & Lozecznik, 2012).

The United Nations' Special Rapporteur on the Right to Food reported unacceptable levels of food insecurity in Canadian northern indigenous communities (De Schutter, 2012). The right to food perspective is consistent with food sovereignty, defined as “peoples' own policies and strategies for sustainable production, distribution and consumption of food that guarantee the right to food for the entire population” (WFFS, 2001). The right to food is acknowledged by indigenous people as one way to strengthen local food systems, eventually having an impact on the whole well-being of communities.

On a macro level, demand for locally produced food is more evident than ever, as we are facing an ecological crisis, but also a food price crisis (Foley, 2010; Holt-Gimenez, 2017).

The techniques of agro-economy have not been able to solve global food production and distribution problem. Rather, on the contrary, research illuminates that the global food system is failing to feed the world and is itself contributing to the spread of inequalities promoting hunger (Holt-Gimenez & Patel, 2009). Worldwide, 70 percent of all freshwater goes to agriculture, and centralized agriculture creates 60 percent of greenhouse gases (Alexandratos & Bruinsma, 2012). Thus, the United Nations has called for “time to rethink how we grow, share and consume our food” (UN, 2018). Zero Hunger is among the United Nations’ sustainable development goals, and to achieve it means producing more with less while preserving natural resources and enhancing the livelihoods of small-scale family farmers (FAO, 2018).

Agro-ecology and sustainability, as strategies to alleviate global food production problems, are consistent with indigenous communities’ traditional food harvesting practices. Historically, their sustainable food systems and culinary traditions have embodied the very essence of sustainability, millennia before it became “invented” by the mainstream societies (Oskal et al. 2018; Egede, 1998). The sustainable use of resources and adaptation to use what the natural environment has had to offer in changing climatic conditions, are the foundation of Inuit food systems (Barnhardt & Kawagley, 2005; Freeman et al. 1998).

In this thesis, I will discuss the development of Arctic gardening and the establishment of northern greenhouses in the northernmost parts of the Arctic, which have not traditionally been agricultural lands to nearly any extent. I refer specifically to a circumpolar agricultural region which is identified as the cultivation of plants and animals between 55- and 70-degrees latitude north (Stevenson et al. 2014a), and therefore include/reference the concepts of ‘North’, ‘Arctic’ and ‘Subarctic’.

Some criticism towards gardening (or agriculture more broadly) among Arctic indigenous peoples stems from the fact that agriculture was initially introduced to the North by

settlers, missionaries and traders. At times, its introduction was aimed to assimilate and settle the nomadic hunters, gatherers and herders of the Arctic. Thus, two objectives arise for the discussion in this thesis: the exogenous and endogenous development of gardening in indigenous communities, and also the need to address the long tradition of northern peoples to utilize what the land, water and air have provided. The specific aim of my thesis is to answer two research questions, drawing examples from northern Canada:

*What impacts can be identified from the development of community gardens and greenhouses in the North and how can gardening contribute to increased food security?*



## 2. BACKGROUND AND FRAMEWORK FOR DISCUSSION

### 2.1 Food and the North

Food culture in the Arctic is a result of 10,000 years of knowledge and the intergenerational transfer of knowledge (Oskal et al. 2018). Arctic, indigenous, food systems have remained intact until recent decades in large parts of the Canadian and Alaskan Arctic, and northern and eastern Greenland, whereas the influence of settler diets spread to most other parts of the circumpolar north during the 19<sup>th</sup> century. Before this, food from animal origins was the main source of nutrition, but also basis of a well-structured food systems supported by the annual cycle of seasons. This rotation or seasonality of harvesting safeguarded against food insecurity but also required intimate knowledge about the behavior of the animals, weather patterns, and access and availability to hunting, fishing and gathering grounds. Indigenous diets were tremendously diverse and provided adequate energy and micronutrients (Willows, 2005). The northern diet consists mainly of marine mammals, fish, birds, land animals, plants and berries, but there are regional variations and cultural preferences between groups.

Eruptions to traditional food ways first came with traders who pushed further North in order to expand access to whale blubber, fur-trade and later, mining (Oslund, 2016 ). The establishment of colonies, followed by missionaries, larger non-indigenous populations, and residential school system marked the first sedentary, indigenous communities, in other words, colonization. Indigenous peoples were introduced to commodities, such as tobacco, sugar, coffee and tea (produced by other oppressed indigenous peoples in a global south, see Mintz, 1984), and their use accelerated through increased global trade and connectivity.

Today, most of the food in the Canadian north is obtained from grocery stores, whereas only about quarter of the food comes from the surrounding land (Roslin, 2007). What makes shopping food in the north drastically different from southern stores is the double or triple price, and often relatively low quality of the goods. Thus people often have no other choice than to

consume ultra-processed food which is low in nutritional value (Willows, 2005; Fieldhouse & Thompson, 2012).

Some presume that hunting and fishing would still provide an abundant and free source of food. However, this is not the case anymore. Hunting is a costly and time-consuming activity. Paradoxically, those people who could afford to go hunting are often those working within office hours. For the unemployed, the cost of weapons, ammunition, snow scooters, boats, and fuel is often out of reach. Even buying the food necessary for longer hunting trips can be a financial obstacle (Fieldhouse & Thompson, 2012). Moreover, animal populations, such as caribou and salmon, have gradually declined, thus creating stricter harvesting quotas.

Eating habits in the north are interconnected to global trends in food consumption, and the global agro-economy's tendency to produce monocrops or large quantities cash crops, although culinary culture is often slow to change. This food economy is highly capitalized and industrialized, and as an outcome, food has become a commodity. In addition, the near monopoly of a few multinational food corporations gives them power to influence governments, natural resources, research, advertisements and even legal cases (Fraser, 2017; Li, 2014). Their dominance has reduced the price of ultra-processed food so low, that culinary choices are often dictated by cost rather than cultural preference or nutritional need.

## **2.2 From food insecurity towards food sovereignty**

Various studies confirm that many northern indigenous groups (Cree, Inuit, Ojibway, Anishinaabe) would prefer to eat more traditional food over market foods, if they would have an access and availability to it, which are the two most important factors of indigenous food security (See: Power, 2008; Willows, 2005; Oskal et al. 2018; Harvesting Hope in Manitoba, 2010). According to the most widely agreed definition, food security exists “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets

their dietary needs and food preferences for an active and healthy life”. (World Food Summit, 1996)

Access to market foods is a major obstacle due to high price and limited selection available in many northern communities. Furthermore, critics point out that the aim of stores is to create profits, and thus to push already high prices of commodities even higher (Marks, 2014). It has been argued that this nearly monopoly-like position that some branches of the Northern Store (successor of the Hudson Bay Company) have today is one form of continued colonialism in the north.

Colonialism has had major negative and long-lasting impacts in indigenous communities, including the disruption of local food systems. Two related consequences have been lower consumption of healthy country food and increased dependency on market foods, which typically in remote communities are mainly ultra-processed foodstuffs, high in sugars and saturated fats. (Willows, 2005). This dietary change has contributed to an increase in type two diabetes, anemia, depression and obesity, which today pose a severe public health concern among northern populations (Public Health Agency Canada, 2011; Harris et al. 2011; Egeland, 2012). Many scholars have identified the connection between broken indigenous food systems, health and social ills (Friders, 2011; Loring & Gerlach, 2013; Willows, 2005). Steward (2014:17) writes that food security “is not a topic that can be placed in a silo apart from other issues surrounding it, such as poverty, education, justice, and health”. Inuit Circumpolar Council (ICC) adds to this:

*We have often heard people within academia, policy and management speak to us of nutritional value, calories and money needed to purchase food. All of this is important, but not what we are talking about when we say food security. We are speaking about the entire Arctic ecosystem and the relationships between all components within” (ICC Alaska, 2015).*

Currently, various initiatives are taking place, as communities strive to connect again with their traditional food ways, or to de-colonize diets. Referring to *food sovereignty* instead of food

security places an emphasis on active efforts or “indigenous activation” towards this direction (McMahon, 2018). As noted, ‘food is not just food’ but at the center of culturally meaningful processes related to harvesting, processing, preparation and distribution. Beyond pure acts, these offer lessons on cooperation, sharing and generosity, which are all important values for many indigenous peoples (Willows, 2005). Food sovereignty aims to address challenges by changing them through action (McMahon, 2018). With gardening, increased independency, self-sufficiency and a way to re-connect past practices are among the important goals (Agriteam Canada, 2013; )

### **2.3 Northern models to support local food systems: Country food markets and hunter support programs**

Globally, an emerging interest to create alternatives to the conventional, global food system exists (Fraser, 2017). Among the drivers for the development of northern food production is resistance to the decades-long process of de-localization of traditional and local food systems into something that can be called a global food economy, or industrial agro-economy (Fraser, 2016). Indigenous peoples in the Arctic have begun to explore how they could harness the power of the market to supply themselves better with local food products, which are often much desired (See Oskal et al. 2018).

Greenland is often said to represent a flagship case for country food production. In Greenland, markets for country food have existed since late 19<sup>th</sup> century, not just between Danes and Greenlanders, in a relationship where the Inuit provided the colonies with hunting products in return of cash and commodities, but among the Inuit too (Marquardt & Caulfield, 1995). The promotion of a country food market was strengthened after the establishment of Home Rule in 1979, as the newly established Government of Greenland wanted to decrease dependency from Denmark (Ibid.). A strategy for food was one part of this goal. Today, country food is obtained from outdoor or indoor marketplaces, where hunters and fishers provide the catch directly. The

sharing of food between friends and relatives is still widely practiced, but also there are also two slaughter facilities in Greenland, which process animals such as muskox, reindeer, sheep, into finely developed products available at the grocery stores. The quality of locally harvested food cannot really compete with the imported, often low-quality meat products, from Denmark (Elde et al. 2018; Kleivan, 1996).

In Canadian Inuit communities, Hunter Support Programs have been among the most successful ways to make country food more accessible. These programs employ local hunters who in return deliver their catch to community freezers, where it is made available to Inuit beneficiaries. (Organ et al. 2014). This program acknowledges the importance of country food to people, as well as the need to support hunters and as such, transfer the knowledge to younger generations (Ibid.).

Although the Hunters Support Program and community freezers are preferred in supplying communities with country food, there is interest towards growing of plants and vegetables in the sub Arctic and Arctic region, as a way to complete existing models.

### 3. GARDENS AND GREENHOUSES IN THE NORTH

I will now shift the focus to my actual topic, the development of gardening in the north. In this thesis, I have intentionally separated gardening from agriculture, although agriculture can be referred as an umbrella term for gardens and greenhouses (Stevenson et al. 2014a). The main reasons for separating these are firstly, that agriculture is a government-subsidized industry and its aim is commercial production, and second, that agriculture is often restricted to those who have a certificate and education (Stevenson et al. 2014a, The Government of Greenland, 2007). Community gardening, by comparison, is less capital intensive, open for the whole community and people learn by doing. Among the main functions is to increase social capital, leisure and increase food security (Porter & McIlvaine-Newsad, 2013).

Gerlach and Loring (2010) illustrate gardening practices in Alaskan Athabaskan communities, describing a history, told rarely. In Alaska, Tanana Flats and village of Venetie, gardens can be dated back to 19<sup>th</sup> century, when settlers, missionaries and traders introduced gardening. Athabascans adopted the practices and continued small-scale harvesting. However, the reason why gardening never became a high interest for mainstream researchers and officials was that indigenous gardening practices were considered as a ‘failure’. Failure, because since the 1950s the US department for Agriculture envisioned to establish commercial, agricultural practices to Alaska. By late 1970s, it was realized it was insufficient in economic terms, so the efforts of the government ceased. Another reason to call gardening development a failure from the outside was the perception of “native group’s inability or lack of interest to nurture gardens long-term”. (Gerlach and Loring, 2010).

Gerlach and Loring emphasize, it was not lack of interest or devotion, but rather gardening activities had to be incorporated to the existing local food system, which was built upon an annual cycle. Gardening had its place of importance in indigenous communities, when other subsistence practices freed people to stay home and garden. In case, the animals were

abundant in a specific year, people would be busy with hunting. In fact, there are records of twenty-four thousand pounds of potatoes and four thousand pounds of a variety of other produce in the village of Venetie in 1961.

Earlier experience suggests gardening can be done economically, technically and socially viable means in the Canadian circumpolar north (Avard, 2015). In Canada, scientists from the southern universities were among the first interested in experimenting with mainly root crops and had success as north as to Ellesmere Island 78 degree north. “Night temperatures inside the green igloos never went below 5 degree Celsius”. (Sadler, 2013). After the 1970’s, previous, systematic gardening efforts ended, as representatives of central governments understood that the ‘last frontier’ was not suitable for agrarian colonization (Stevenson et al. 2014a).

The so-called second coming of northern gardening arose in late 1990’s (Avard, 2015). In Canada, much of the current interest towards gardening and greenhouses stems from the expectations of positive community development and increased food security, and particularly the latter is brought up in research and policy programs (Skinner et al. 2014; Doucette et al. 2014). In addition, the ability and importance to grow own food and decrease dependency is gaining importance (Kawaja, 2016; Avard, 2015).

An example of this is a gardening program the Northern Healthy Foods Initiative (NHFI) in Manitoba, which adopted a multi-sectoral approach by, involving six governments departments, three community based organizations, a school division and a province wide food security organization. The program is administered and managed by department for Manitoba Indigenous and Northern Relations (Government of Manitoba, 2019).

NHFI was created on four components: 1) home and community gardens 2) greenhouse pilot projects 3) school nutrition 4) food preservation (Fieldhouse & Thompson, 2012). The benefits of the program have spread to 80 communities, with over 1000 gardens and 50

greenhouses. These communities have historically been gardening but practices ceased over time. Moreover, the project materialized into a participatory video *Harvesting Hope in Northern Manitoba Communities* exploring issues of food sovereignty in Canadian indigenous communities.

Fieldhouse and Thompson (2012) assessed NHFI, and their conclusion was that local food production is viable to improve food security but also the importance of community based action with sufficient policy acknowledged. The program was popular in the communities and according to an elder; it brought a lot of community development (Ibid.). However, without permanent policy, infrastructure change and capacity building NHFI's impact could be transitory.

Many indigenous sub-Arctic people refer gardening or agriculture as part of the food sovereignty movement or decolonization of food systems, which is not the case among Inuit, to whom programs which support hunting are a priority (Mundel & Chapman, 2010). Yet, the results indicate that many Inuit communities do believe gardening can have an impact on adding less-costly and nutritious food on the plates (Lamallice et al. 2018).

In Inuit regions, cultural sensitivity is needed when addressing gardening in the Arctic. "Other than seaweed, berries, and certain herbs, greens have never been part of the Inuit diet" or even if cabbage would cost two dollars, there is no guarantee the Inuit mother would buy it. However, Suzanne Etheridge, from the Iqaluit Community Greenhouse Society is pointing out that cultural norms are changing. "It's not that the Inuit are against growing food, it's just they need to learn more about how to do it. The Inuit are trying to adapt, and that is something they are very good at". (Nobel, 2013).

Long-term ethnographic research by Gerlach and Loring (2013:1) in rural, native, Alaskan communities suggests a new direction for food-system design that "prioritizes the management of place-based food portfolios" and the commitment for local and regional food



production and harvest as large extent as possible. This includes also successful experiments with gardening. Literature and research on community gardens includes notions such as:

*The phenomenon of community gardens has become much more than a flower patch or vegetable garden: It has become a place of personal, community and environmental sustenance where food security, socializing, playing and democracy fight back against a corporate food system.*

(Porter & McIlvaine-Newsad, 2013: 380)

However, there are some major challenges common to this region such as securing local involvement and ownership from the beginning, resources (energy, soil, and equipment), long-term funding and short growing season. (Avard, 2015; Skinner et al. 2014, Field notes, 2018). It is to these elements that I turn in the current thesis project work.

#### 4 THEORETICAL TOOLS AND METHODOLOGICAL CONSIDERATIONS

I chose to use community capacity building and particularly the concept of endogenous development because both acknowledge and emphasize development processes from the recognized needs of local communities, as a priority for development. By incorporating notions from the endogenous development paradigm, the ethics of conducting research in northern communities is strengthened (See: Ali & Kelly, 2011; Ermine et al. 2004). Moreover, it is recognized that successful governance and leadership factors in northern, indigenous communities require identification of communities' unique visions for development. To this end, if the engagement for a community project comes from external sources, the project is less likely to succeed and have a long-term impact (Agriteam Canada, 2013). However, in certain projects, such as greenhouse and gardening development in the north, there is a need to adopt multidisciplinary approach and use combination of knowledge's: technical expertise, scholarly and politico-economic evaluations, after the approval of the community.

Despite the need for a collaborative research in the northern communities, I did not have the opportunity to conduct collaborative research myself. The reason for this is my position as a MA-level student without a required network and naturally evolved relationships built on trust and experience from the field. Neither was adequate funding available, and yet, I am grateful for the Center for Sámi Studies for the funding I received and which took me all the way to the Northern Village of Kuujjuaq. During my stay on the field, I paid attention to introduce myself with clarity and explain what was my motivation and reason to be in the community. In addition, I am committed to send my final work to the stakeholders I have been in contact with. This is at least a minimum requirement to begin with a genuine collaboration, one way to give back is to be transparent.

## 4.1 Community capacity building

Community capacity building (CCB) approach emerged together with concepts such as ‘community empowerment’, ‘community development’ and ‘community capacity’ during the 1990’s within the environment of international development and these terms are often used interchangeably. Debates exist regarding the meaning, similarities and differences, which I cannot go into details, except that in order to discuss CCB meaningfully, ‘community’ and ‘capacity’ needs to be defined with clarity and in practice (Chaskin, 2001). Equally important is to critically assess the term before applying it in indigenous frameworks where it has been integrated by the mainstream researchers and practitioners often in insensitive manners (Chino & DeBruyn, 2011; Makuwira, 2007; Smith, 2012).

This chapter provides definitions, which will be applied in the last chapter to the empirical practice. Chaskin’s (2001) definition of community capacity applies, namely:

*The interaction of human capital, organizational resources, and social capital existing within a given community that can be leveraged to solve collective problems and improve or maintain the well-being of a given community. It may operate through informal social processes and/or organized effort.*

Within ‘capacity’ dimensions such as participation, leadership, social support, sense of community, access to resources and skills, and the importance of these in developing and empowering local coalitions are acknowledged at the core of the term. Others, such as the readiness of a community to work to improve existing conditions, and the social capital necessary for communities to move forward and collaborate are also relevant dimensions of CCB. Regardless, these features can be acknowledged as positive steps in development and they support the idea of using local knowledge, none of these have been specifically developed by or with indigenous communities (Chino & DeBruyn, 2011). Yet, indigenous peoples have become main objects in many development processes, and this makes the use of the term problematic (See Smith, 2012).

Chino and DeBruyn (2011) state: “the conceptualization and implementation of capacity-building strategies are themselves disparate in that they are based on Western frameworks rather than on indigenous epistemologies and indigenous ways of knowing”. Moreover, this can lead to building strategies that do not necessarily meet the needs and realities of indigenous communities (Ibid.). Often non-indigenous researchers, stakeholders and NGO’s (alternatively the Western models) assume that the CCB approach is applicable to indigenous communities, after resources and skills have been identified, and defined on the community’s terms, and assessed within a relatively short time span. What these models often exclude are the importance of culture, language, questions of identity, place and belonging. The fact that indigenous peoples need to operate at the same time in indigenous epistemologies but also in dominant cultures, has fostered a dialogue among indigenous researches for the need to, according to Labonte & Laverack (2001), transform the power relationships. Consequently, indigenous peoples needs to define and develop approaches themselves, in order to gain positive social change for themselves. (Ibid.). An illustration from The Harvard Project on American Indian Economic Development aims to verify why, for instance, American Indian tribes differ in their economic development strategies and why culturally appropriate governance of a community contributes to successful economic development (See: <https://hpaied.org/>).

#### **4.2 Endogenous and exogenous development in indigenous communities**

*Northerners have good reason to be cynical about the interest that comes from the south.*

(Struzik, 2010)

Endogenous and exogenous development are concepts much used in rural development studies, and applied in multi-level and multi-actor processes. Exogenous development is an initiative outside a local region, whereas endogenous development is controlled by a local region. In other words, exogenous is a top-down approach whereas endogenous development is a bottom-up (Ibid.).

According to Vanclay, endogenous rural development (ERD) has layers of meaning and many scholars consider ERD as a worldview and philosophy about appropriate development, while there is no single agreed definition (Van der Ploeg et al. 2000; OECD, 2006). Exogenous development projects have historically been the norm for Northern regions. This continues to be the case today. The following quotation illustrates much of the realities in the north:

*When southerners open a mine, the jobs go to southern Canadians, the profits go to the head offices in faraway places, the taxes go to Ottawa, and the northerners are left with a hole in the ground* (Struzik, 2010).

Some argue that exogenous development is based upon a modernist point of view, which has gained enormous criticism within development studies the past 20 years (Rapley, 2004). This criticism has institutionalized to as post-structuralism or post-development critique (Ibid.). The starting point for the critic is that development is itself an arbitrary concept rooted in a meta-narrative, which, in turn, reflects the interests of its practitioners. This metanarrative (which was little contested prior to post-development) of development was understood to mean rising living standards, which would manifest in rising incomes (growth), which in turn would translate into improved health, nutrition, education and personal autonomy (Rapley, 2004). Endogenous rural development, among others, is a reaction and resistance to this (Vanclay, 2011).

This means, among others, that ERD highlights the value of local culture, tradition, artisanal production and regional typical food in development processes (Vanclay, 2011). Moreover, utilization and celebration of local and place-based dimensions of a region as the basis of its economic activity and livelihood is emphasized (Ibid.).

ERD is found mainly, though not exclusively, “on locally available resources, such as the potentials of local ecology, labour force, knowledge, and local patterns for linking production and consumption” (Long and Van der Ploeg & Saccomandi, 1994:10). Moreover, ERD recognizes that rural areas provide a range of non-market goods and services such as

environmental protection, landscape management, preservation of biodiversity and habitat protection, ecosystem services, carbon sinks, maintenance of cultural heritage, employment and livelihoods for rural people and food security (Vanclay, 2011). Local control and self-determination are fundamental, as “rights of people to have a say on the things that affect their lives”. It can be concluded that ERD primarily relates to development as a social concept rather than as economic growth (Ibid.).

The critics of ERD have argued that “it is a nice ideal but not practical, that local areas will never be free of external influences in a globalizing world” (Vanclay, 2011). Another critique is from Lowe et al. (2004:87) arguing that exogenous/endogenous division “privileges an artificial spatial polarity”, and the authors suggest to stress the interplay between local and external forces in development processes. The point in my thesis is not to illustrate that northern communities’ can and should be fully self-serving (food) regions, as this would be a utopia. But what has to change is that the regions within the circumpolar north, (south vs. north) must be more balanced in socio-economic terms. So that the southern capital regions are not exhausting its national, northern counterparts, or for the north to be seen as a source of natural resources for the national economy, over the people who have been living there for a millennium. Neither north should be a field for social scientific experiments were models created elsewhere are uncritically applied to. An example is given by an Inuit artist, Mike Feneker Thomsen, in relation to development in Greenland which has applied a model created for Denmark. Instead of “copy-pasting” a system that functions for a population of five million in a small country, Greenland should be looking for a system that functions for a vast country, with a population of only 50.000. It has to be simpler, he adds (Rasmussen, 2016:35).

The fact is that the north, maybe scarce with population, is rich with local cultures and diverse knowledge’s. By applying an endogenous rural development model in northern governance, much of the socio-economic dimensions which people themselves wish to keep,

are highlighted as important development goals, and thus development projects will likely have a long-term impact and positive social change on northern communities. In order to reach this goal, collaborative research is an asset and a necessity.

## 5 CASE STUDY – KUUIJUAQ GREENHOUSE MODEL

Case study is an approach used in social sciences, which involves in-depth and detailed examination of a subject of study, the case, including its related contextual conditions. In research case study is a formal research method, which needs to follow the ethical guidelines and sound practices of any other method applied among communities, organizations or individuals. Case study presented here includes qualitative evidence, relies multiple sources of evidence and benefits from the prior development of case studies conducted in Nunavik. This case study excludes quantitative data and can be categorized as illustrative case study with an aim to “make the unfamiliar familiar” and to provide a reader a common language about the greenhouse development in Kuujjuaq, Nunavik.

### **5. 1 Methodology and limitations of the study**

I arrived to Kuujjuaq in September 2017 for the purpose to visit the greenhouses and community garden. Due to financial concerns I could not extend my stay for over four days or visit other (of the many) greenhouses in the Canadian Arctic. In Nunavut, Iqaluit would have been the closest, with a greenhouse society. Alternatively, the oldest and largest northern greenhouse community in Inuvik, North West Territories.

The analysis presented in the next chapter is based on four principal methods: 1) a review of existing literature 2) key-informant discussions 3) observation 4) interviews.

I was lucky to meet my key informant, Ellen Avar, on the airplane from Montreal and we introduced each other's already before setting our feet in Kuujjuaq. Thanks to her and my Quebecois host, I was able to conduct three interviews during my visit. Two with stakeholders from Kativik Regional Government (non-Inuit) and one non-Inuit gardener. On the third day, I observed a school visit to the greenhouses. I was welcomed to use the library of Makivik Corporation in order to extend my knowledge of the region as have a base during my stay.



In addition to people I met in Nunavik, three interviews have been conducted, two through skype and one face-to-face with scholars with vast experience from indigenous communities, gardening and agriculture in the north. One interview took place with a leading developer within a community garden project currently evolving in northern Norway, Tromsø.

As part of GENI program, I had one-month internship at the Greenlandic government's agriculture and training center in Upernaviarsuk, south Greenland in summer 2016, which materialized into an assessment of the agricultural policy of the Government of Greenland.

The literature review included both academic and applied research, as well as unpublished documents.

The limitations of my research from the beginning has been very few published studies related to gardening among arctic and sub-arctic indigenous groups, particularly so of research and documents written by indigenous peoples. This challenge is also noticed by Skinner et al. Lack of sources has narrowed my analysis and conclusions should be taken as results of a relatively small sample of existing publications. Another challenge in delivering data has been my short stay in the community and very limited sample of interviewees. In order to have a thick description of a case study I acknowledge longer time spent on the field would have been a necessity. Still, I was able to re-connect to Kuujjuaq through Ellen Avard, in the end part of my thesis writing process, to have follow-up discussions about the current state of the community garden.

## **5.2 Introduction to Kuujjuaq**

Kuujjuaq, meaning the great river, is one of the 15 northern villages located in Nunavik, Canada, which consists third of the province Quebec, north 55<sup>th</sup> parallel. Nunavik is the homeland of Inuit with 90 per cent Inuit residents, who call themselves Nunavimmiut. (Makivik Corporation, 2019).



Kuujuaq is the largest town and a central transportation hub and administrative center of Nunavik. Kuujuaq is at the borderline of tundra and tree line, the rest of the region towards north from Kuujuaq is a treeless tundra with a sub-Arctic and Arctic climate, with permafrost. Overall there are 12 000

residents in Nunavik, and 2132 in Kuujuaq. The population is growing in Kuujuaq as well as in all northern villages. This is in line with the trend of population growth in indigenous communities in Canada more broadly. (Fieldhouse & Thompson, 2012; Makivik Corporation, 2019).

Inuit have been in the region for over 4000 years, historically being nomadic people (Makivik Corporation, 2019). The first trading post (permanent settlement) was established to Fort Chimo, 5 km from Kuujuaq, in 1830's and missionary school hundred years after, in 1932 (Avard, 2015). Colonialism in the north has proceeded from trading posts to missionaries, from capitalism to Christianity, and this was the case in Kuujuaq too.

Practically all the residents of Kuujuaq were accustomed to sedentary lifestyles by 1960's after government education system was imposed on all Inuit together with social transfer payments (Makivik Corporation, 2019).

Year 1978 marked a cornerstone moment for Nunavik when the James Bay and Northern Quebec Agreement granted the region with more political rights, and led to the establishment of Kativik Regional Government. Another important outcome was the founding of Makivik Corporation, which represents the Inuit of Nunavik in dealings with the governments of Quebec and Canada.

### **5.3 The greenhouses and community garden of Kuujjuaq**

Kuujjuaq already had a greenhouse for over 25 years, which was used by the University of Laval for research purposes. The greenhouse was revitalized in 2009 by researchers, government bodies and community stakeholders (Avard, 2013). Canadian Ellen Avard began to examine the degree of interest and attitudes of the residents of Kuujjuaq towards growing food in the community and consumption of vegetables. The findings of her MA thesis *Greenhouses in Arctic Communities: A Study of the Perceptions of Nunavimmiut Regarding Alternative Systems of Food Production*, were positive and supported a greenhouse-based food development and to her surprise, Kuujjuammiut had already been experimenting with small-scale greenhouses and gardening for decades (Avard, 2015). Avard continued developing this further as part of her dissertation *Northern Greenhouses: An Alternative Local Food Provisioning Strategy for Nunavik* (2015).

The initial research design of Kuujjuaq greenhouse model and first practical work was done by and in a cooperation with Quebec Horticultural Association, University of Laval and representatives of Kativik Regional Government (KRG). The KRG was willing to support the initiative from the beginning and today Kuujjuaq Greenhouse Committee runs the garden with the help of volunteers. (Inuit Tapiriit Kanatami, 2019; Personal communication, 2019).

Before the community garden was established in Kuujjuaq, among the main expectations were positive impact on food security and positive community development. In addition, supporters envisioned it as a first step in “agro-food development strategy” which would be developed specifically to meet the needs of individual northern communities (Avard, 2013). Moreover, it was emphasized that greenhouse should be run as a collective, as Inuit have a strong tradition on sharing and giving, and this practice could be maintained in the greenhouse activities (Avard, 2013; Kishigami, 2004).

There are 46 garden beds total in the two greenhouses, one of which are used by individual gardeners, some by families. In addition, there are shared garden beds, which are nurtured by people collectively and the produce shared among the town residents.



The experience has shown that collective plots are more productive with a better yield (Field notes, 2017). In 2016, Lamalice et al. monitored six garden beds and weighed the harvest together with volunteers, and the total harvest was 148.3 kg of edible plants for the season. In case this result would be extrapolated to cover all of the 46 beds, the production would increase to 1.15 tons of vegetables, potentially (Lamalice et al. 2016).

During the second phase of Kuujjuaq Greenhouse Project, there were experiments done with potatoes, but before these were harvested and yield measured, they were stolen from the soil (Avard, 2015). Still, plans to begin with potato beds has continued further.

During the first seasons, Inuit were a minority of the gardeners in a town where Inuit are in a majority, as was the case according to my informant still in 2017 (Field notes, 2017). The

Inuit portion of the gardeners is increasing and recently the ratio has been about half, when in 2012 it was one third (Personal communication (May 2019)).

#### **5.4 Challenges and criticism**

Poor fertility and low precipitation characterizes Arctic soil, which do not make it ideal for gardening. In case soil and fertilizers needs to fly by air, sustainability of northern gardening can easily be contested (Lamalice et al. 2018; Sadler, 2013). In addition, using fossil fuels for heating and electricity, then environmental dimension of sustainability of northern greenhouses is an easy target for criticism.

For this purpose, Lamalice et al. (2016) have conducted research on soil type including testing of pH value in Nunavik among others. Their conclusion was that local soil can be used if limed first (in order to alkaline it), and thus it becomes suitable for gardening. (See: Stevenson et al. 2014b).

As a reply for solar challenges in a region where the sun won't set for 60 days, research has confirmed the effects of long summer days on plants are often positive and can produce exceptionally large crops (Stevenson et al. 2014b). In the winter time, crucial is to utilize the angle of sunrays and solar heat to a largest possible extent, and as such, locations and structures placed according to the winter sun angle (Lee, 2012). In addition, to minimize energy demand, the use of passive solar greenhouses would be most economical in the north. According to Karen Tanino (2018), a Canadian biologist, passive solar greenhouses are sufficient to support seasonal gardening. Alone the use of passive solar greenhouses without any high technology or use of electricity extends the growth season already with months (Tukker, 2016).

In Kuujuaq the greenhouses are not artificially heated neither lit. Due to this, the growing season is limited to 20 weeks (Lamalice et al. 2016). However, according to Tanino and others, the LED technology has advanced to a level that makes their use in northern greenhouses

affordable and highly effective – extending the growing season to eight months (Personal communication, 2018).

(Pictures by Saara Sipola)



## 6 ANALYSIS

When the Kuujjuaq greenhouse pilot-project began, many questioned the initiative. One reason being the large portion of Inuit residents, with no agricultural traditions. There were issues whether this would be culturally appropriate and socially acceptable (Avard, 2015).

Looking back at this evolution and progress, which has taken place in Kuujjuaq since 2009, the results of today might have surprised the most persistent sceptics. Much has happened; new initiatives have recently been introduced, as there seems to be no end in sight for the efforts to produce more food in Nunavik.

One drastic difference between indigenous and non-indigenous perceptions on northern greenhouses has been the question; should there be focus on economic profit, or social benefits? There is a tendency among those, outside communities, to place importance on the profit creation, and commercial vegetable production. (Allen, 2014). Indigenous communities do not reject the opportunity to produce commercially; however, the priority seems to be on the social benefits and wellbeing gardening can contribute and sharing of food (Agriteam Canada, 2013). Often the desired short-term impacts are to increase availability of vegetables and recreational and educational benefits and in the long-term have a positive impact on the community and provide a safe communal space. Last, to keep opportunities for commercial production open. This chapter will assess the evidence as to the potential food security, social and other benefits.

### **6.1 Food security**

The main argument for and driver to develop gardening are its expected benefits to alter food insecurity, by decreasing cost and increasing the quality and access of vegetables. This has been confirmed to be the priority, for both indigenous and non-indigenous people and is the goal behind collaboration (Agriteam Canada, 2013; Doucette et al. 2014). A report by Natcher & Chen (2019) acknowledges that there is limited research on the actual impact community

gardens and greenhouses can have to alleviate food security, and thus the actual impact on food security remains unknown. This is also in line with the report of International Center for Northern Governance and Development stating “A commercial or community greenhouse is not *the* solution to northern health and food security, but is certainly *a* solution” (Exner-Pirot, 2012). Natcher and Chen confirms the value of gardening to community development and providing youth with training and education opportunities. Natcher and Chen are currently working on a report on the benefits of gardening in more details. The work is supported by Arctic Council’s Sustainable Development Working Group (SDWG) and the final report is published during spring 2019.

The two officers I spoke with at KRG (6.9.2017) were more reserved on the impact of increasing the overall situation of food security in the region purely based on gardening. As for the purpose, the community would need to produce eggs and the possibility to breed rabbits were in consideration, in order to have a source for protein. According to the latest information, rabbit breeding in Salluit has been rejected by the community, but the egg production has made progress. In July 2015, 120 chickens were flown to Kuujjuuaq from Montreal, safe and sound (Rogers, 2015). The aim is to deliver inexpensive eggs to Kuujjuammiut, when a dozen eggs cost 5.90 in a store, these eggs have been sold at 3 dollar/dozen. In addition to the supply of fresh eggs, poultry operations has been incorporated as a part of the community gardens, as a source of organic fertilizer for the plants (Elde et al. 2018). The hatching experiment is also sensitive to the value for sharing and giving food in Inuit communities. The first eggs were given to the elder’s home and non-profit organizations in town. After Kuujjuammiut had tasted these eggs first, they became a product for the local market, yet the profit is used to feed the birds and maintain the operations and the project was meant as non-profit from the beginning. (Rogers, 2015; Malley, 2014).



Although, the research results are missing of the likeliness of gardening to alter food insecurity, there is solid evidence to believe something positive might come out from the investments to gardening projects. In 2017, in order to address food security and sustainable development, the Quebec government allocated five million CAN dollars to develop greenhouse gardening in the northernmost territory, with the initiative they had in mind, growing-season could be extended to eight months (CBC, 2017). The Société du Plan Nord is the agency in charge of the sustainable development in Northern Quebec. In addition to set sustainable development into action, the goal of the government is commercial vegetable production in Kuujjuaq, from where it can supply communities even further north (CBC, 2017).

## **6.2 Social benefits**

Lamalice et al. (2016) conducted a participatory action research in Kuujjuaq between 2015 - 2017 from 22 gardeners to collect feedback about the benefits from gardening. This study does not specify socio-economic background of the gardeners, neither ethnicity.

In the answers of those polled, 35% related to general well-being, as gardening is ‘fun’, ‘relaxing’, ‘pleasant pastime’, and ‘family activity’; 27% referred to good quality of the vegetables; and 23% considered gardening as a learning opportunity (Lamalice et al. 2016). Ten per cent of the answers brought up the importance of ecological dimension, as food can be produced without pesticides and gardening increases contact with nature (Ibid.).

### **6.2.1 Community cohesion**

Community cohesion is one result found in urban gardening projects and research has confirmed the value of people from different socio-economic backgrounds, yet from the same neighborhood, getting together in the gardens. Firth et al. (2011) recognized that, in cases when there would not be a collective space where to share interest on gardening activities, it would be rather unlikely that these people would have met. This has also been the case in Kuujjuaq,

where the community garden has provided people with a place to meet new people from the community (Personal communication, April 2019).

During my stay in Kuujjuaq, I heard that there exists a degree of division between the Inuit and Qallunaat, people from outside (Field notes, 2017). This is not uncommon in indigenous communities due to colonial past and uneasy presence of the people originally from south (See: Johnston & Tester, 2015). Moreover, the fact that Inuit make up 65 per cent of the jobs in the regional government, of management positions only 33 per cent are held by Inuit, and the councilors at the KRG say they want to have more Inuit employees (Rogers, 2015). In addition, southern recruits have better standard housing than many local people do, in a region where poor housing conditions and overcrowding of the Inuit residents is a problem. (Duhaime, 2004). In addition, the turnover is high in northern and indigenous communities. In Kuujjuaq, approximately 60 per cent of the southerners stay an average one-year or less (Field notes, 2017; Personal communication, May 2019). Given this reality, the community cohesion that community gardens can foster can be recognized a great benefit.

In an interview for *Nunatsiaq News*, an Inuit gardener supports this view by emphasizing, that garden is “open for anyone, it’s non-racial, non-denominational, and it’s our job to make sure it stays that way.” In addition, “having a place to garden is also an asset to meet other people and to develop the sense of belonging to the community” (Piche et al.2019).

A southern gardener I spoke with had participated in three growing seasons in the greenhouse. He thought it is a good leisure activity, and he hoped to continue on the next season too. However, due to the popularity of gardening, the plots available were limited and not all willing to participate were guaranteed a spot. Thus, many can lose the valuable inputs (soil, fertilizers) invested on the garden beds which is undesired (Field notes, 2017).

Another criticism also arises from the limited amount of gardening beds. According to an Inuit gardener, there has been complaints how non-Inuit, transients coming to work in Kuujjuaq

took most of the plots in the greenhouse, and the fact the greenhouse was originally meant for the local population. According to him, there should be more emphasis put forward for the local population.

*I was unhappy about that fact that strangers (transients) living in Kuujjuaq just for a few months or a year were getting plots when they already receive benefits from their employers with paid shipping for their food ordered from the south.*

The greenhouse committee has listened to this request and now tries to facilitate more the local gardeners (Personal Communication, May, 2019).

In connection to gardening, other horticultural projects, such as forms of therapy has been recognized. The Ungava Supported Housing implemented one, together with residents with mental disabilities. Few of the people living there built and planted their own indoor garden with an impact to pleasant atmosphere (Rogers, 2011; Avard, 2014).

### **6.2.2 Learning opportunities**

*Indigenous peoples worldwide have always believed in sustainable ways of thinking, being, and making decisions... We are hoping to link this community-garden concept to our science and health courses so that students are able to make a connection between theory and practice.*

(Herman Michell in Tanino et al.)

Beyond food security and community cohesion, the practitioners of gardening have acknowledged the impact it can have on learning and education (Exner-Pirot, ). Others have recognized the increased interest towards food and healthy eating in general among those who are engaged in gardening activities (Skinner et al. 2012). Gardening in the north has foremost been a practice of learning and experimentation, as much of the crops are not indigenous.

In discussions about gardening in the North, one theme has raised beyond others, education of the youth, but also increasing interest to produce food locally. People “want to eat food that comes from the land, and to eat healthy, but in the grocery stores it’s quite expensive, and it isn’t always as fresh as they would like.” (Simoneau, 2019).

In an interview for *Nunatsiaq News*, a gardener from Kuujjuaq said that her two sons are the reason why she does gardening. They attend the gardens few times a week to water the plants, and eat the produce directly from the gardening beds. (Rogers, 2013)

The excitement of the children was easily felt during a class visit to a greenhouse, during my stay in Kuujjuaq, as they were eagerly competing who will get to water the plants, ask questions about vegetables they did not recognize or just seeing the compost, generated curiosity (Field notes, 2017). Moreover, I heard later from a gardener, that one of the challenges currently is that the local population and particularly young people, plus seven years old, are getting interested in gardening, to such an extent that there would be potentially a need for a third greenhouse. There has been talks “to set up a smaller greenhouse near the bigger ones for kids to grow simple fast growing vegetables”, the idea has been well received by the greenhouse committee but no decisions has been made yet on the extension. (Personal communication, May 2019).

For the adults too, Kuujjuaq greenhouse has provided the opportunity to learn to garden, or to garden better (Personal communication, May 2019). The study by Lamalice et al. (2016) recorded gardeners saying that the greenhouse is valued as a way to ‘learn to garden’, ‘share knowledge and skills’ and a ‘learning opportunity for kids’. Despite, carrots and potatoes are among the most consumed in the community and used in traditional dishes, to learn to garden new types of vegetables, Asian bok choy, has inspired people to cook and try new foods (Personal communication, April 2019).

Regardless of the interest to experiment with new plants and herbs, Lamalice et al. recorded the views of the residents in Kangiqsujuaq that people would hope to grow local plants. In Kuujjuaq, there have been experiments with mountain sorrel, which is indigenous to north, and particularly the residents in the Elders home have appreciated donations of this plant. (Personal communication, April 2019).

### **6.2.3 Spin-offs to strengthen the local food system**

The Kuujjuaq case has given lessons that the dimension of waste-management should not be overlooked among other spin-offs of the development. Particularly in the case of Kuujjuaq two interesting “micro-projects” have literally been fueled by gardening. First was the creation of a compost, in order to create fertile soil/fertilizers on acidic soil in Kuujjuaq. However, composting is limited in the north due to reduced microbial activities in cold soil (Stevenson et al. 2014b). Compost program was possible because of the new alliances and agreements between two grocery stores and Greenhouse Committee. Volunteers collect the waste on a weekly basis (Rogers, 2011). In practice, twice a week Supported Housing or the residents with mental disabilities collect bio-waste to communal compost from where it is available for all the gardeners. Compost program has created unconventional jobs for people to whom finding employment might be an additional stress factor in a community where unemployment is relatively high and positions mainly within the public sector (Field notes, 2017; Avard, 2015).

Part of the sustainable development project, funded by The Société du Plan Nord and owned by Makivik Corporation, in December 2018, hydroponic growing container was installed to Kuujjuaq and what Avard and others envisioned ten years ago, became reality (Simoneau, 2019; Plan Nord, 2017; Avard, 2015). Hydroponic gardening is to grow food without soil, and this is something that has been envisioned for northern communities years behind due to lack of fertile soil (Lee, 2012).

Newviq’vi Dépanneur Inc. a convenience store in Kuujjuaq operates the hydroponic systems and distributes the food it produces. Approximately, 70% of the produce will be sold in store, with the other 30% distributed among community organizations, such as elder home and daycares. The grower container can produce up to 400 plants a week, and this is enough to cover most of the demand in Kuujjuaq (Simoneau, 2019). This would make a significant contribution to reduce “food miles”.

The Kuujjuaq hydroponic container uses garbage as a source of heat, thereof the waste-to-energy, name for the process. The garbage of the residents, burned before in the open air, can be utilized by the thermal waste station. Moreover, Sauve, the CEO of Growcer adds, “The heat recovered from this production would heat the greenhouse and maybe some buildings” (CBC, 2017). The Growcer hydroponic containers are planned from the beginning to operate in northern and remote locations and thus build in a manner to avoid over-complicated and expensive technologies (Ibid.).

After, only few months of operation it is too early to assess the broader impact hydroponic growing has on the community and beyond, but at least “the crops are growing well”, says Nathan Cohen-Fournier, the socio-economic development officer at Makivik Corporation” (Simoneau, 2019). According to the latest information, lettuce has been successful, and there is demand for these in the community. (Personal communication, April 2019). However, there has been some technical issues and the volumes of the produce has not yet reached the optimal output. (Personal communication, May 2019).

The success of the Kuujjuaq case has inspired other northern villages in Nunavik to start-up their own gardening projects. Villages of Inukjuaq, Kangiqsualujuaq and Kangiqsujuaq are already making progress together with community residents and researchers, after the strong interest of the communities was first identified (Personal communication, 2019; Lamalice et al. 2016).

## 7 DISCUSSION

I began my thesis with a reference to the unfortunate situation of indigenous people's high degree of food insecurity, particularly of people living in the Canadian Arctic. Food insecurity, which is ultimately a consequence of broken, local, food systems, caused by colonialism, capitalism and climate change, has also been a driver towards developing alternative food strategies in the north, including gardening. Although the funding institutions, such as the Quebec Government and the Federal Government of Canada, have included greenhouse development into their northern development strategies, as way to alter food insecurity, researchers have acknowledged that too little data exist yet to assess the impact of gardening upon food security. In spite of this, gardening and greenhouse development have had other widely shared benefits in many northern communities, and is nevertheless a driver to increase food security and on community development. In this last discussion chapter, I connect my findings from the case study and situate them within a broader theoretical discussion about the: 1) origins of gardening, northern food systems and challenges 3) ecological benefits 4) social capital 5) collaboration 6) cultural sensitivity and last, 7) food in relation to food sovereignty and the politics of the food.

### **7.1 Origins of gardening, northern food systems and challenges for further development**

*My big wish would be to see our young people doing the traditional ways of preparing meat and hunting, gardening and berry picking – everything to do with our food chain in the north.*

(A woman from South Indian Lake, in Harvesting Hope in Northern Manitoba)

Successful food system interventions in indigenous communities around the world have four common characteristics: 1) traditional food harvesting, 2) agricultural and gardening activities, 3) education about food production and nutrition, and 4) growing community food plans through collaboration. (Kuhnlein et al. 2008). These have all been already considered and researched in the northern context, albeit with a lesser volume on agricultural development.

Although there have been home- and community gardens over decades in the Arctic and over centuries in the sub-Arctic, commercial, large-scale agriculture most likely will not have the preconditions to succeed in line with sustainable development goals. Reasons include the fact that there are physical challenges associated with northern gardening such as soil conditions, unpredictable weather, harsh winds, and access to water in some communities. Sources for heat and energy come mainly from fossil fuels and an extensive use of these would not contribute on building sustainable northern communities. However, many argue it is an important secondary or “backup food system” alongside subsistence hunting and fishing, and market food (Stevenson et al. 2014a), as it is important recreational activity for the residents by its own value. This is certainly consistent with my findings and that of others in Kuujjuaq. Loring and Gerlach have found out that gardening “filled a niche within local food ways and provided one of many important components of a flexible and diversified subsistence strategy” (2013:1). Among the Inuit, social challenges include how to integrate cultural and social aspects of food with the current, economically driven system (Doucette et al. 2014; Gombay, 2010). Others, such as lack of gardening knowledge, which can lead to a high dependency from local champions does exist.

## **7.2 Ecological benefits**

Gardening and greenhouse development in Nunavik has incorporated an ecological dimension from the beginning, as one of the three pillars of sustainable development. This has been the case among most of the northern greenhouses, which aims to produce vegetables by using passive solar energy, or highly energy sufficient LED-light sources, which are proven to be efficient in the northern greenhouses. In addition to minimize energy dependency, the practice to produce organic crops is often emphasized within the indigenous communities (Lamalice et al. 2018; Field notes, 2016). In Kuujjuaq, gardening activities have led to a creation of a



compost, which can be used to enrich acidic soil and used as a fertilizer. Moreover, the chicken manure from the hatching house is an excellent source of organic fertilizer.

### **7.3 Social capital**

Social capital, which LeDuke refers to as “the close social bonds that facilitate cooperative action, social bridging, and linking to share and access ideas and resources” used to be strong among indigenous peoples before residential school system and settler education (in Ballard & Thompson, 2013:50). To rediscover lost food skills has been one of the ways to increase social capital. The NHFI program in Manitoba’s First Nation communities, previously discussed, has confirmed the impact of gardening and greenhouse development to foster social capital in terms of creating job readiness, cooperative action and development of commonly shared ideas held by communities. This has led into concrete impacts on serving the communities with fresh, less-costly food and through meaningful action (Doucette et al. 2014). The community garden in Kuujjuaq has served as a communal meeting point since its establishment in 2009. In 2012 it was reported that about one third were Inuit gardeners, and in 2019 about a half. As my findings show, in addition to this, the interest towards gardening is increasing, particularly among schoolchildren. This interest is prompting the consideration of new greenhouse development specifically for youth.

According to Chaskin (2001) community capacity building, which includes aspects of both social capital and social cohesion, is about participation, leadership, skills, sense of community and organizational resources. In the case of Kuujjuaq, CCB has included several community members into negotiations, strategic planning, solving common problems – and thus empowering local coalitions. The creation of a Greenhouse Committee, agreements with grocery stores for composting, and meetings with the school board and KRG are just few examples of internal actors within the community. However, the greenhouse development has required external network and partnership building from the start.

#### **7.4 Collaboration through exogenous and endogenous development approaches**

From the multidisciplinary aspect of collaboration, Power's (2008) notion on the need for grass-roots decision making and collaboration concerning food security and community development should be considered in the case of Kuujjuaq. This includes understanding what food security means for indigenous people, and the policy implications of addressing food insecurity, which are further complicated by the diversity among indigenous people in Canada and the diversity of food consumption patterns. In the gardening context, arguments for grass-roots decision making and collaboration include that "community members know local soil and social conditions, community preferences and can identify unique solutions not readily apparent to others" (Doucette et al. 2014). Decisions what to plant are especially important due to cultural preferences.

The Kuujjuaq greenhouse pilot project aimed from the beginning to include local-level collaboration in order to address food security strategies, but also to build community capacity (Avard, 2015). This has involved local gardeners and volunteers, childcare centers, supervised apartments, municipal administration of Kangiqsujuaq, the Northern Village of Kuujjuaq, Makivik Research Center, Nunavik Regional Board of Health and Social Services.

External collaborators in the project were University of Laval, the Horticultural Association of Quebec, Quebec Government and the Federal Government of Canada. These institutions have been able to offer organizational, expertise as financial resources outside the community. Without this help, the project might not have progressed—at least not at the same pace.

The latest project in Kuujjuaq, the hydroponic grower container, can be identified as an implementation of circumpolar innovation, which refers to commercialization of science and technology (S & T) (Coates, 2016) and comes as a result of the culmination of endogenous and exogenous development. A Montreal-based company, the Growcer, has been working closely with northern communities across Canada for three years, and consciously designs its products

in consideration of the particular needs and challenges of the north. An innovation which supports, not only the implementation of S & T but also can impact the quality of life is of particular interest in a region which is left behind in national innovation strategies (Coates, 2016). In Kuujjuaq, this means creating heat energy from the waste while providing the opportunity to impact on more efficient food system.

Moreover, most of the community garden projects in the north have been collaborative efforts with an emphasis on capacity building and partnership research. Among the results of this is that it has inspired other communities to initiate gardening projects, and this growth has been an asset to attract further funding back to Kuujjuaq. The desire to help other Indigenous communities has been recognized as one outcome of the Kuujjuaq greenhouse project (Personal communication, April 2019).

## **7.5 Cultural sensitivity**

Cultural attitudes toward food cultivation vary among northern indigenous communities, and not all are interested neither in gardening activities (often initiated by the newcomers or outsiders) nor in eating lettuce and other vegetables. According to a researcher Sonia Wesche, “There is a sense it’s not for them, it’s for the people who have come from elsewhere...” (Poppick, 2018). This is partially because many Inuit still identify strongly as hunting people, and embrace the products of hunting rather than agriculture.

One finding of this research has been that gardening projects in the north place emphasis on the development of community gardens instead of commercial ones. “Many communities view community economic development from a collective rather than individual perspective, preferring to share the benefits of a successful harvest rather than sell surplus food” (Doucette et al. 2014). In the report by Agriteam Canada (2014), data collected from communities in northern Saskatchewan, stated that communities were primarily interested of non-profit or limited-profit models in almost all cases. Profit generation was seen as important but was never

the dominant objective of any community consulted. Occasional profit, jobs, improved health reduced food prices, better quality food, as well as community involvement and engagement were all priorities. Particular emphasis was placed on the programs involving youth and elders. It is further acknowledged that discussing profit ahead of community might not be culturally sensitive or appropriate. The Kuujjuaq case reiterated these approaches.

Another culturally meaningful value within indigenous communities and one which is prominent in IQ is the importance of sharing, which has found new forms in the gardens. Much of the produced crops in Kuujjuaq are shared among friends and community members, and in particular, the Elders Home has been included in the circle of sharing. Moreover, in Kuujjuaq greenhouse, there are specific ‘sharing plots’ which are available for those without individual gardening bed, and a free access to all.

## **7.6 Politics of the food**

The concept of food sovereignty has layers of meaning. It does not only refer to food security but covers all the aspects discussed in this thesis, and beyond. Winona LaDuke asks, “If you can’t feed the people, can you call yourself a nation?” (in McMahon, 2018) This question summarizes much of the importance of local food systems for indigenous peoples and can refer to among other the close connection between indigenous peoples, food and culture. By eating country food in a world where there are several options, one confirms and maintains identity as an Inuit (Kleivan, 1996). Indigenous people have themselves felt as “passive observers of development” unable to influence the course of action taken by external powers (Rosing, 1981). However, the active efforts by indigenous communities to address food security challenges has proven to provide progress globally, but also in the Canadian Arctic, where local communities have successfully initiated country food programs and raised their voices against high food prices in the north. This has led into the creation of new policy programs and community development initiatives. For many, this action is fundamentally about the de-colonization of

diets and the strengthening of local food systems. There is a commonly shared vision of development that the day that Aboriginal people take control of their own community planning and governance is the day that we will begin to see positive changes (Johnston & Tester, 2015; ). This requires significant policy changes, and prioritizing of Inuit into decision-making positions as a first step (Ibid.).

## 8 CONCLUSION

In my thesis I have discussed the northern greenhouse development and Arctic gardening, focusing on the Canadian Arctic. A case study from Kuujjuaq, Nunavik, illustrated more in detail the evolution of community garden, which aim from the start was to foster positive community capacity, rather than produce vegetables commercially. The results and data from Kuujjuaq confirm that gardening has already brought community development in Kuujjuaq, not only among the Inuit and non-Inuit gardeners, but the operation during the past 10-years has involved regional and provincial stakeholders, institutions and individuals to strengthen cooperation in order to address food security and community development.

Among the drivers to develop gardening initiatives in the north has been its expected impact to increase food security, and this has been included in the provincial and federal development programs and funding strategies in Canada. However, to date, no confirmed results exist yet between the connection of gardening in the Arctic and food security. Nevertheless, northern scholars and community members agree together that the development of community gardens do have social benefits for the communities. My research has shown this. Greenhouses in Kuujjuaq have provided a meeting place for residents from different socio-economic backgrounds, served as educational platforms for schoolchildren and learning and experimentations sites for adults – particularly for the Inuit population without a traditional knowledge of gardening, which was perceived as potential obstacle in developing gardening in the Arctic. Among the spin-offs has been implementation of what Coates refer to as circumpolar innovation, the hydroponic growing container. This has further questioned the opportunities to produce food in an efficient and sustainable manner, than has been thought earlier. However, development projects in the north needs to guard themselves against over-innovation, which is a risk when external strategies and further plans are laid.

Research done in many northern communities, including Nunavik, Northern Saskatchewan and northern Manitoba has confirmed by now there is a local interest and need to develop gardening and greenhouses further. However, among the research findings has been that communities with a majority of indigenous population place emphasis on non-profit and non-commercial operations. The importance to provide an open access to all community members and the opportunity to share produce is highly valued. This does not exclude local and regional economic development, which is recognized as important, but economic development (as applied to commercial country/local food production) and assessment of projects more broadly in northern communities should include full-cost accounting which brings together non-market goods, such as environmental and social assets, into the development equation, as advised by United Nations (FAO, 2019).

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