Seeds for Thought: Fostering Rural Resiliency through Agro-tecture

by

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Dalhousie University is located in Mi'kmaq'i,
the ancestral and unceded territory of the Mi'kmaq.
We are all Treaty people.

Contents

Abstract

Post-anthropogenic food industries have disconnected people from the land and, inherently, their food. Such issues have contributed to increasing levels of food insecurity across Canada, disrupting food memory and culture. This thesis investigates the problem of food insecurity as a local subject in rural towns in Canada. The context of Cochrane, Ontario, serves as a testing ground, as it exists as a connector between the north and south, the remote and the urban. The architectural project intertwines a cyclical program, from growing to wasting, and modern foodscapes, such as regenerative farming and foraging. The intersection of architecture and agriculture can lead to solutions by increasing food yield and enhancing intrinsic knowledge. By learning to see through the lens of food, we can dissolve disconnections between people and the earth to foster future land stewards.

Acknowledgements

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To my mom and dad, Shelley and Peter De Joseph, you have always been my biggest support. This document is the end of one long chapter, a chapter that I could not have completed without you both. Thank you for always supporting my adventures. To my Grandma, Mary, who always believed in me. All of our time in the kitchen sparked my passion for food, and led me to this thesis.

Finally, thank you to all my friends and classmates who came along for this journey. I could not have gotten through late nights, early mornings, and long days without you all. I will have lifelong memories of our time in the studio.

Chapter 1: Introduction

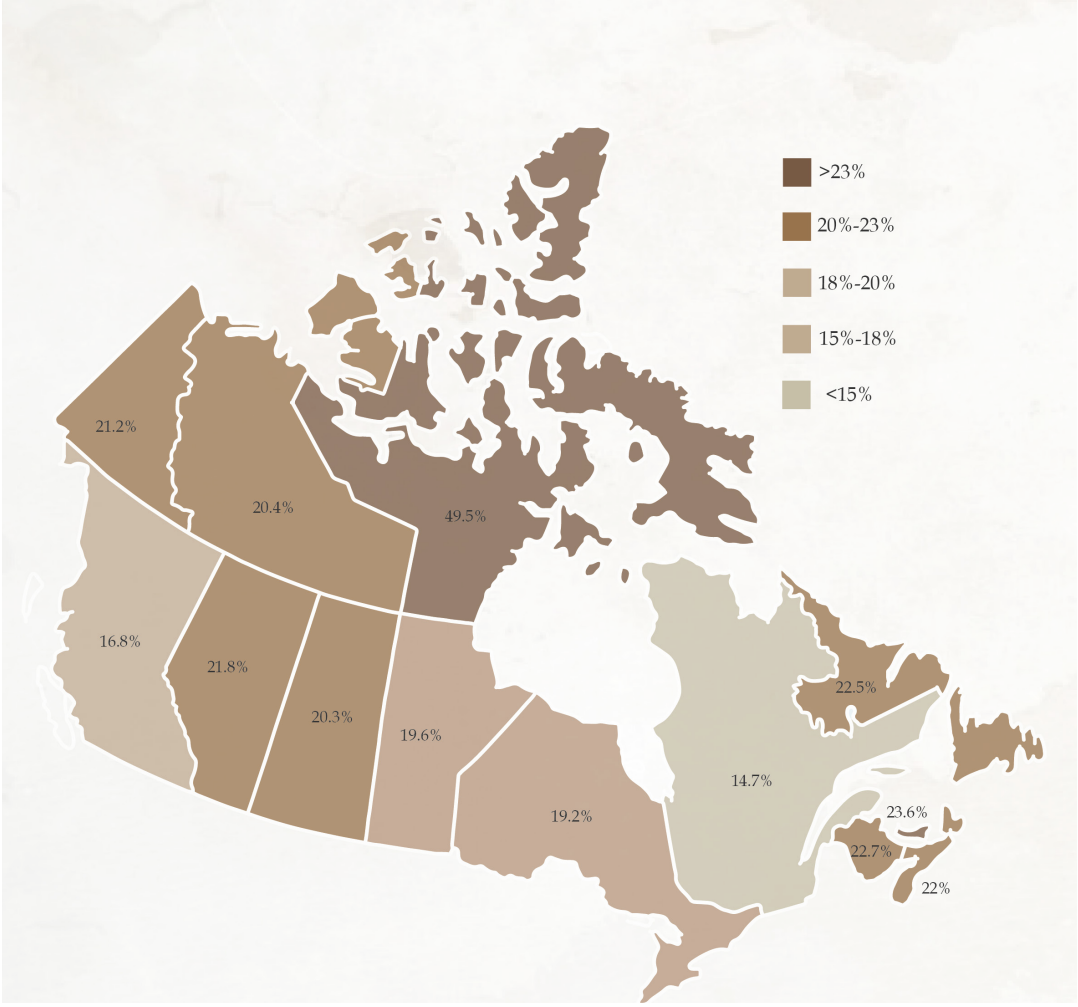
Food is always a part of the local culture in Northern Ontario; it is to be celebrated. To survive in Northern rural communities such as Cochrane, Ontario, indigenous, colonial, and immigrated peoples would share food production and preservation methods to merge cultures. In such communities, food production goes beyond traditional agricultural methods and expands to activities such as foraging, hunting, and fishing, yielding food and forming a sense of belonging. Cochrane, Ontario, is not a place accessible to settle; many Southern Ontarians would move there hoping for prosperous crops, only to be driven farther East to the Abitibi by the harsh winters. Once modern infrastructure was created, Cochrane developed an exceptional connection to the rest of Canada via railway and Trans-Canada Highway. However, today, fresh and seasonal produce is hard to obtain. Due to transportation costs, these products are often highly unaffordable and much less nutritious than their Southern urban counterparts. Food is not meant only for survival but also to contribute to the culture and resilience of a place—food insecurity further challenges that sense of belonging in rural areas.

Post-anthropogenic food production methods have led to higher rates of food insecurity across Canada. These issues of food access impact climate change and health, with more people who are food insecure reporting chronic conditions such as heart disease. Presently, people report feeling disconnected from the natural environment, which results in an irresponsible separation from nature. These issues have led to the question: How can the intersections of regenerative farming, foodscapes, and

architecture foster a stronger connection between inhabitants and the land to combat food insecurity? Modern food systems constantly disrupt food memory and culture. When a whole-community approach is disregarded, stewardship of the land is lost. However, this thesis posits that by realigning food systems through architecture, we can reduce insecurity levels. This is not a task for a few but a call for all to step up and take responsibility for our food systems.

The theoretical methodology is formed around a cyclical toolkit defined by traditional ecological knowledge (TEK). Like regenerative agriculture, TEK promotes the distribution of intrinsic inter-generational understanding to help community members address respect and connection with the land. By redirecting current food systems, we can create new local pathways that lead to a more resilient infrastructure. My proposal seeks to translate a linear relationship of food production into a cyclical relationship by applying a whole community approach.

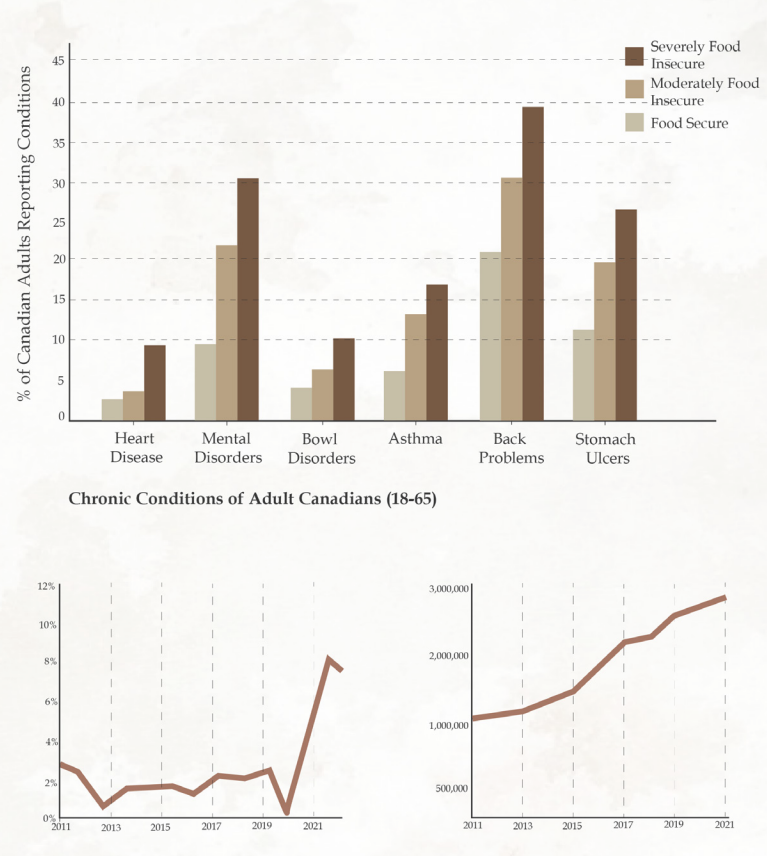
Addressing the knowledge gap will enhance our environmental imagination of a food place, evoking a new awareness of the earth (Klaver 2007). Reanimating the idea of a Sitopa, coined by Carolyn Steel, can intersect ideas of food and place to embrace local methods and traditions. Architecturally, the project will be a place to grow food as well as preserve, store, and process food waste. This circular economy aims to diversify food growth and social relationships to form a more formalized food-sharing system.



Food security in Canada by province or territory. (Data source: *Statistics Canada 2020).*

Food Security

Food insecurity is defined as an “inability to obtain a sufficient, nutritious diet due to income or geographic-related food access” (PROOF 2023). Food security has been a progressing issue since the Anthropocene, which disturbs millions of Canadians’ lives (Roshanafshar and Hawkins 2018). Across Canada in 2022, 18.4% of people in the ten provinces lived in a food-insecure household (PROOF 2023). It is accounting for 6.9 million people or 1.8 million children. Scaling down to Ontario, in 2022, 19.2%



Food insecurity statistics. Date source: *Statistics Canada Table 13-10-0834-01, Canadian Income Survey; Territorial estimates, 2020.*

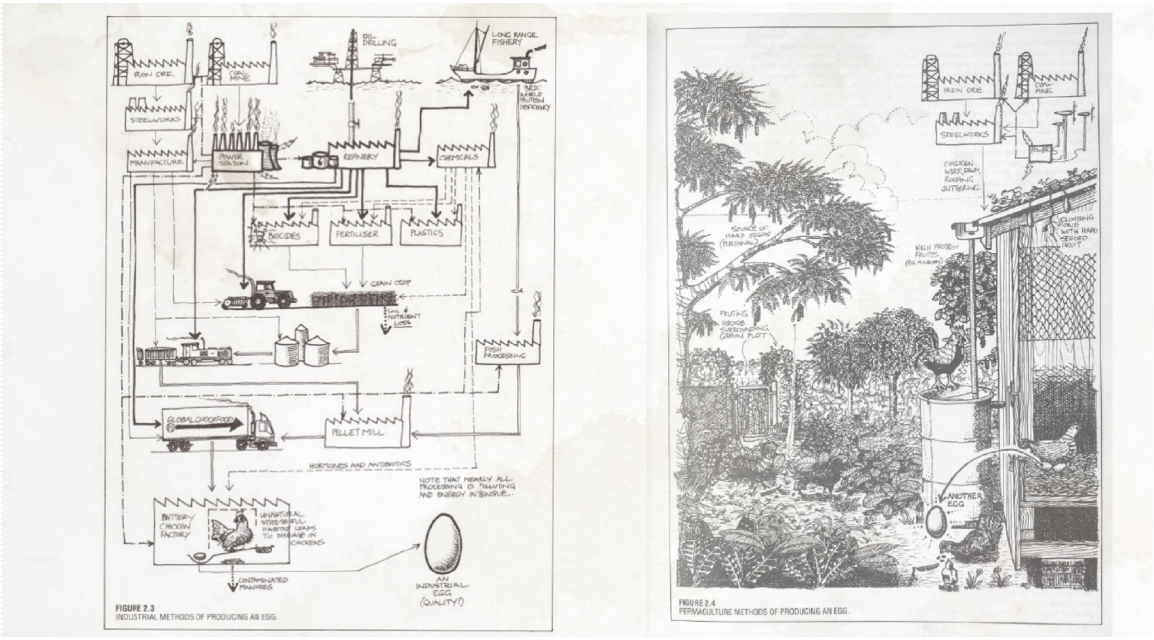
of households in Ontario are food insecure, equating to 2,340,000 people who don't have access to nutritious food. It is important to note that the Canadian Price Index (CPI) in Ontario was up from 3.2% (2021) to 7.1% (2022).

Many factors have contributed to higher levels of food security, including transportation, climate change, and the pandemic. Because we rely on a capitalist-based food system, the impacts of food insecurity have rapidly and disproportionately affected Canadians (PROOF 2016).

Food insecurity primarily negatively affects food access, health conditions, and the environment. Recent research has shown that children are most impacted by food issues (Anderson et al. 2023), leading more food-insecure youth to

seek mental disorder counseling. It is important to also note that food insecurity rates in northern and Rural communities are disproportionately higher due to transportation costs. Furthermore, many of these northern communities are also largely indigenous, displaying inconsistent food access for indigenous peoples (Anderson et al. 2023).

The current industrialized food sources provide many preservatives and GMOs, contributing to the health of adults. Healthcare rates are 49% higher for adults living in moderately food-insecure households than in food-secure households (PROOF 2016). Additionally, the issue of food insecurity undeniably affects our environment, hindering climate change efforts across the globe. As food insecurity increases, so does wasted food, contributing to landfills. In Food Security: Excess to Enough, Ralph Martin argues that the world overproduces almost double the amount of food produced, 40% of which goes to waste in Canada. “With



Bill Mollsion’s illustration of industrial methods of egg production, *Permaculture: A Designers’ Manual.* (Mollison 1988).

the added challenges caused by a changing climate, loss of plant diversity should be at the forefront of ecological concerns since we have yet to be able to determine exact tipping points for ecological breakdown" (Martin and May 2019).

Anthropocenic Food Industry

Post-anthropogenic food industries have mainly been concerned with capitalist and consumerist values. "In 2016, the International Commission on Stratigraphy agreed that the concept of the Anthropocene—the human epoch—is of sufficient scale to be considered part of the geological time scale" (Marshman, Blay-Palmer, and Landman 2019). This mindset has critically impacted biodiversity, food security, and socio-ecological relationships. The current food practices and methods are not sustainable, and there is a danger to the ecology and agriculture of today. For example, a mono-culture approach has led to a loss of crop diversity, negatively impacting local ecosystems and landscapes (Marshman, Blay-Palmer, and Landman 2019). An oligopolized, small group produces most of the goods, and a market system regarding the provision of foods exists throughout Northern Canada (Robidoux and Mason 2017). The resolution to these issues is a whole community approach.

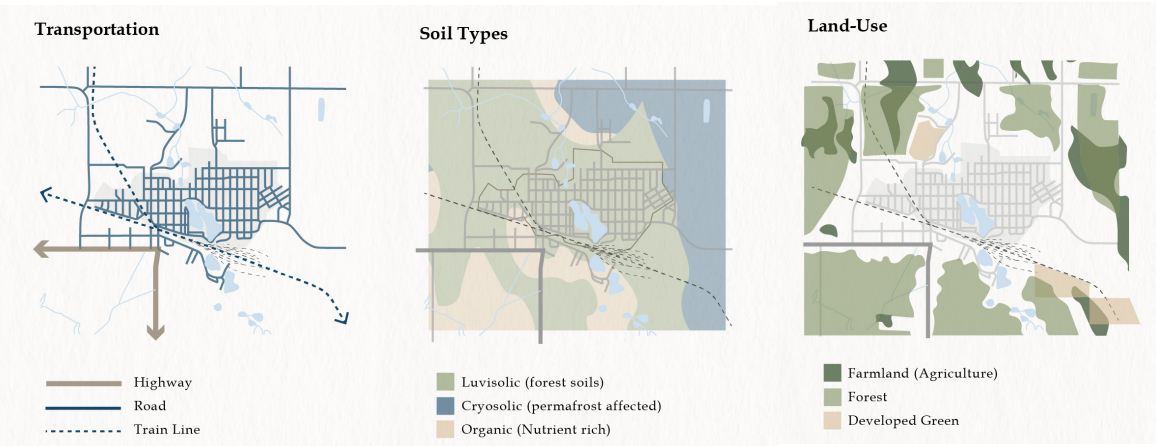
The "anthropocentric privilege of our species" (Marshman, Blay-Palmer, and Landman 2019) stems from a dualistic ecological politics that deprioritizes our dependency and interconnectedness with other living things and our environment. There is a need for a more integrated relationship between humans and the natural world, "one that acknowledges and supports the intrinsic value of all

parts of the ecosphere" (Marshman, Blay-Palmer, and Landman 2019). Consumers and producers should find new ways of thinking and approaching agriculture, and architectural agriculture plays a vital role in this adaptation. A deeper understanding of how socio-natures manifest and "how engagement with these spaces translates into more integrated, productive, and inclusive communities" (Marshman, Blay-Palmer, and Landman 2019) is the beginning of a solution.

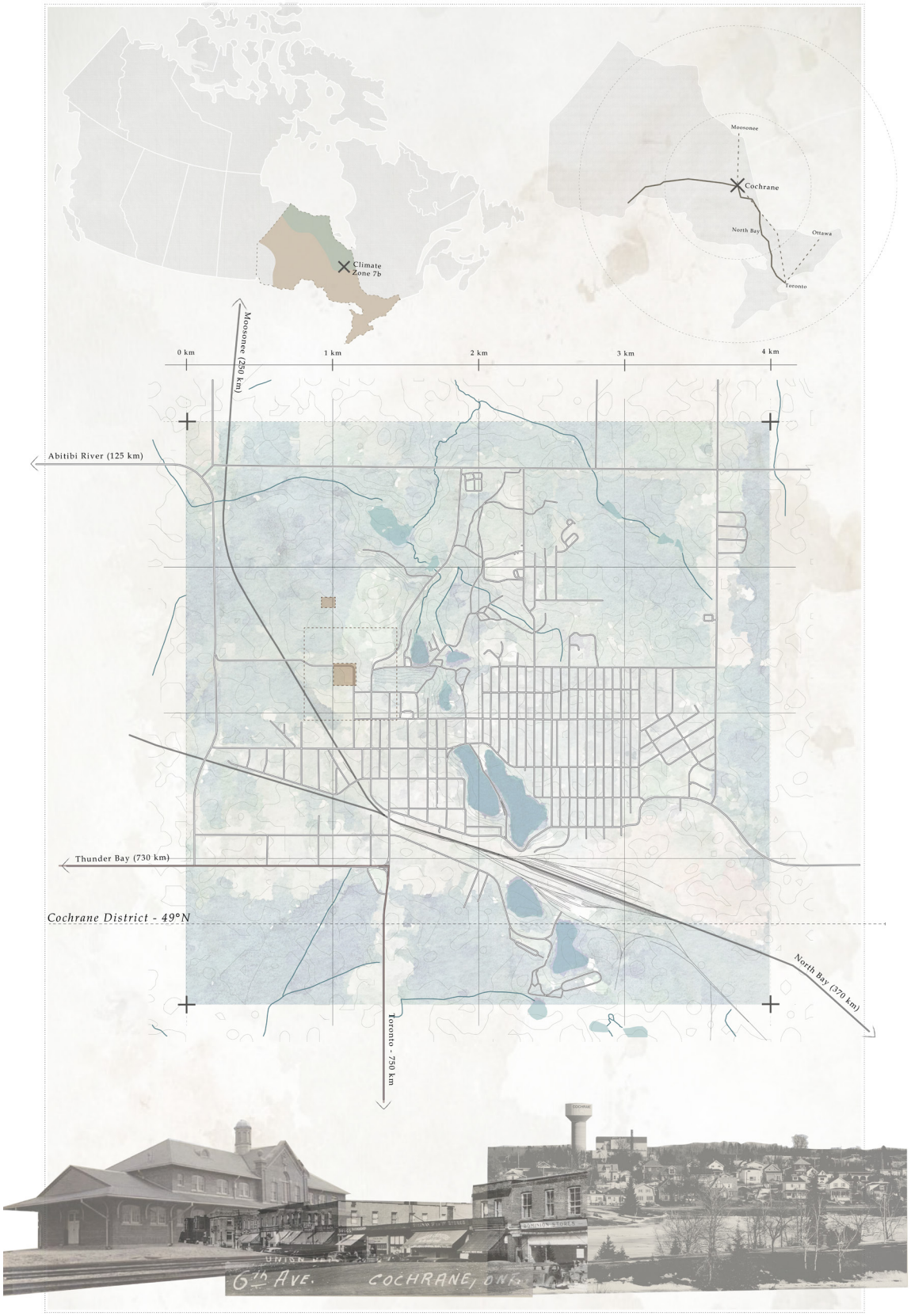
Chapter 2: Cochrane, Ontario

History and Culture

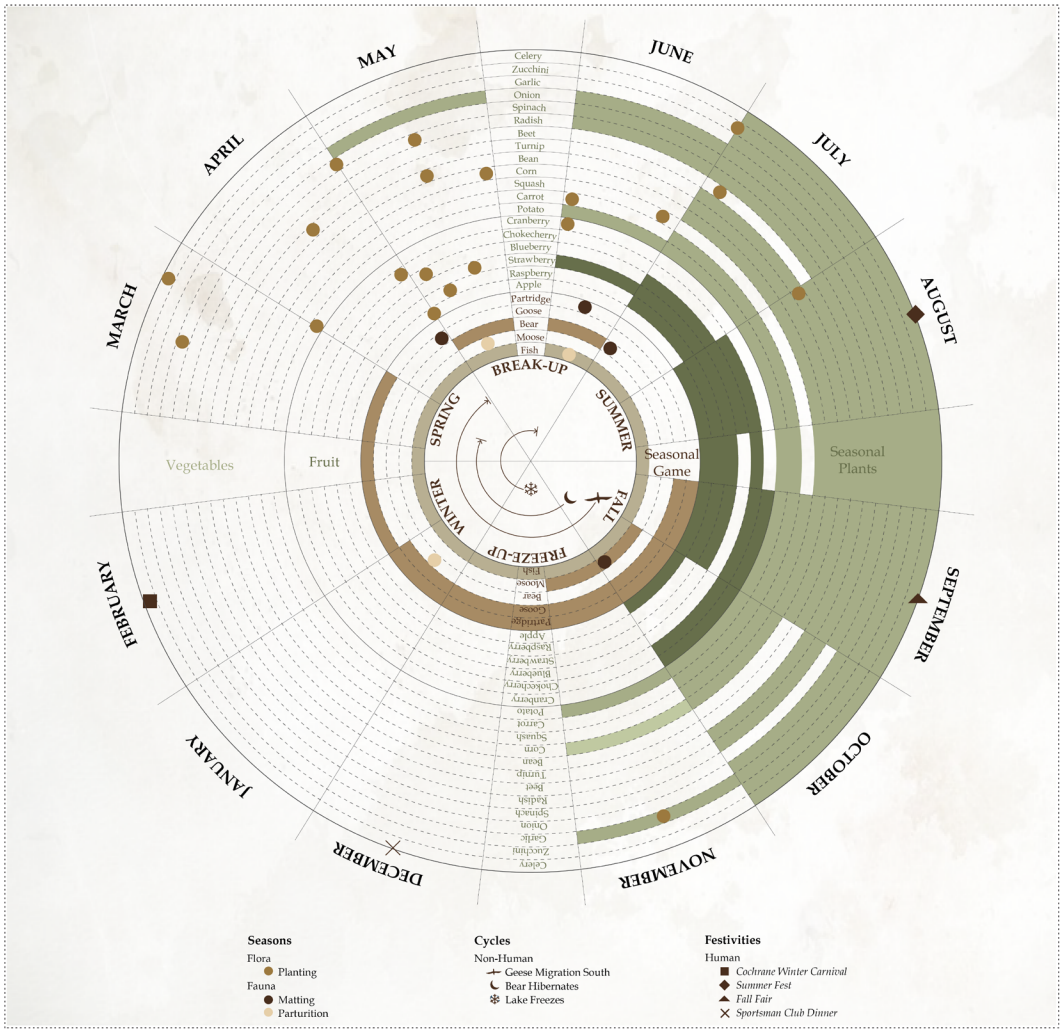
Situated just past the 49th parallel, Cochrane is a rural Northern Ontario community home to approximately 5,000 residents (Statistics Canada 2017). The ancestral land of Cochrane belongs to the Cree, Ojibwa, and Anishinabewaki peoples. I want to acknowledge the treaties and indigenous territories that now cover the land that we call Ontario, the land where this thesis project is based. The traditional indigenous methods and land practices have enriched this thesis proposal. This town is an excellent precedent for rural communities for its connection to the rest of Canada via the Trans-Canada Highway and National Railway. With winter lasting about six months, residents will see as little as eight hours of daylight, affecting the growing season and one's well-being. Correspondingly, temperatures in the winter can reach below negative forty degrees Celsius. Despite the harsh conditions, many people participate in winter activities, such as cross-country skiing, snowshoeing, and snowmobiling, to embrace the local seasonality.



Site analysis of Cochrane, Ontario.



Cochrane, Ontario site map and its connection to the rest of Canada.



Seasonal produce and game season available in Cochrane, Ontario.

Before being established as a town in 1910, indigenous peoples were called Cochrane Little Lakes Campground, and it was used as a camp by many Cree and Ojibwa peoples passing through. 1905 Ontario Northland chose Cochrane as the main junction for the Canadian National Railway because of the mineral deposits and timber resources. In the 1920s, Highway 11 was built, linking Cochrane to North Bay, then in 1943, the highway was expanded East, marking the creation of the trans-Canada highway. The 1930s witnessed the establishment of numerous farm settlements in Cochrane. However, the enthusiasm of

families from Southern Ontario was met with the harsh reality of the region's challenging farming conditions. Many of these settlements, unable to sustain strong farming practices, eventually faded away. Undeterred, these families sought new opportunities in the Abitibi area, drawn by its milder climates. Today, Cochrane's main industries and workforces are centered around forestry and mining, a testament to the town's resilience and adaptability.

Like many cultures, the people of Cochrane historically have collaborated and bonded over the food culture in the area. Because of the Indigenous values and isolation of the town, hunting, fishing, and foraging are primarily practiced. Moose, bear, geese, and partridge are hunted mainly for food in the winter months. Everyday preserved products include pickerel, pike, trout, and bass, which are fished year-round. The local food reinforces a sense of belonging and resiliency. Various fruits and vegetables are grown locally, as seen in the diagram below. Even though the winters are harsh, many community members embrace the cold months through local festivities.

Cochrane is a theoretical and literal connector of place. As a transitionary state between urban and remote communities, this community bridges current transportation and socio-economic breaks.

Rural Resiliency

Ian McHarg discusses how the inward journey from the countryside to the city symbolizes the evolution from land-based life to the emergence of communities. Food growth can establish rural resiliency (Dupre and Bischeri 2020) and a sense of place through adaptive methods, giving residents the tools to thrive agriculturally and beyond.

As populations shifted from the city to the countryside, perspectives and values also shifted (McHarg 1971). We should consider our place in nature's world; this gives power to rural landscapes. Rural sociology describes a community: "People must form social groups to complete agricultural tasks and help together through collective characteristics" (Lefebvre 2003). Resiliency in rural areas is more potent than in cities because of a keen sense of community, belonging, and kinship towards an area. For example, Cochrane was destroyed by fires in 1910, 1911, and 1916, but its residents rebuilt it each time. The intentions demonstrate the community members' commitment to the town and established sense of belonging.

Although many associate the countryside with agrarian values (Lefebvre 2003), many rural inhabitants are disconnected from the land today. Since these geographic areas are historically complex due to colonial values, there is a knowledge gap between people and the environment. The solution begins by rekindling our respect for the earth and the environment. Consumerists have lost wisdom in agriculture;

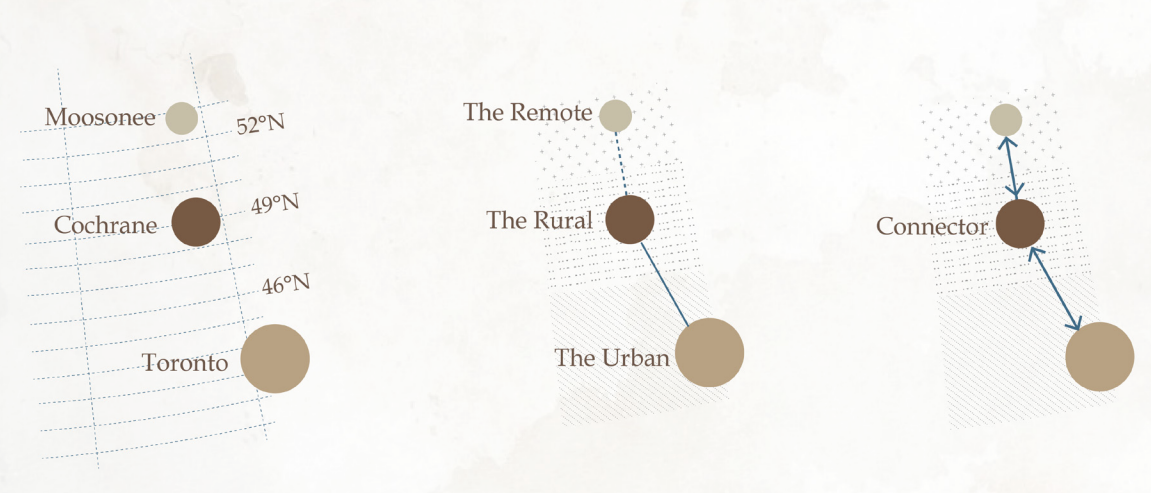


Diagram describing Cochrane as a connector between the urban and remote.

now, they focus on mass production. Conventionally, farms naturally have a circular economy, but today's production is a one-way flow, interrupting biodiversity and local ecology. A shift in perspective is required so consumers formulate respect for the land through intrinsic knowledge.

Cochrane serves as a connection between the urban and remote, the south and the North. It is connected by Highway One to urban metropolises and by the railway to remote northern communities. Therefore, the rural is a space of in-between and a place to resolve disconnections of land and food. By viewing the remote

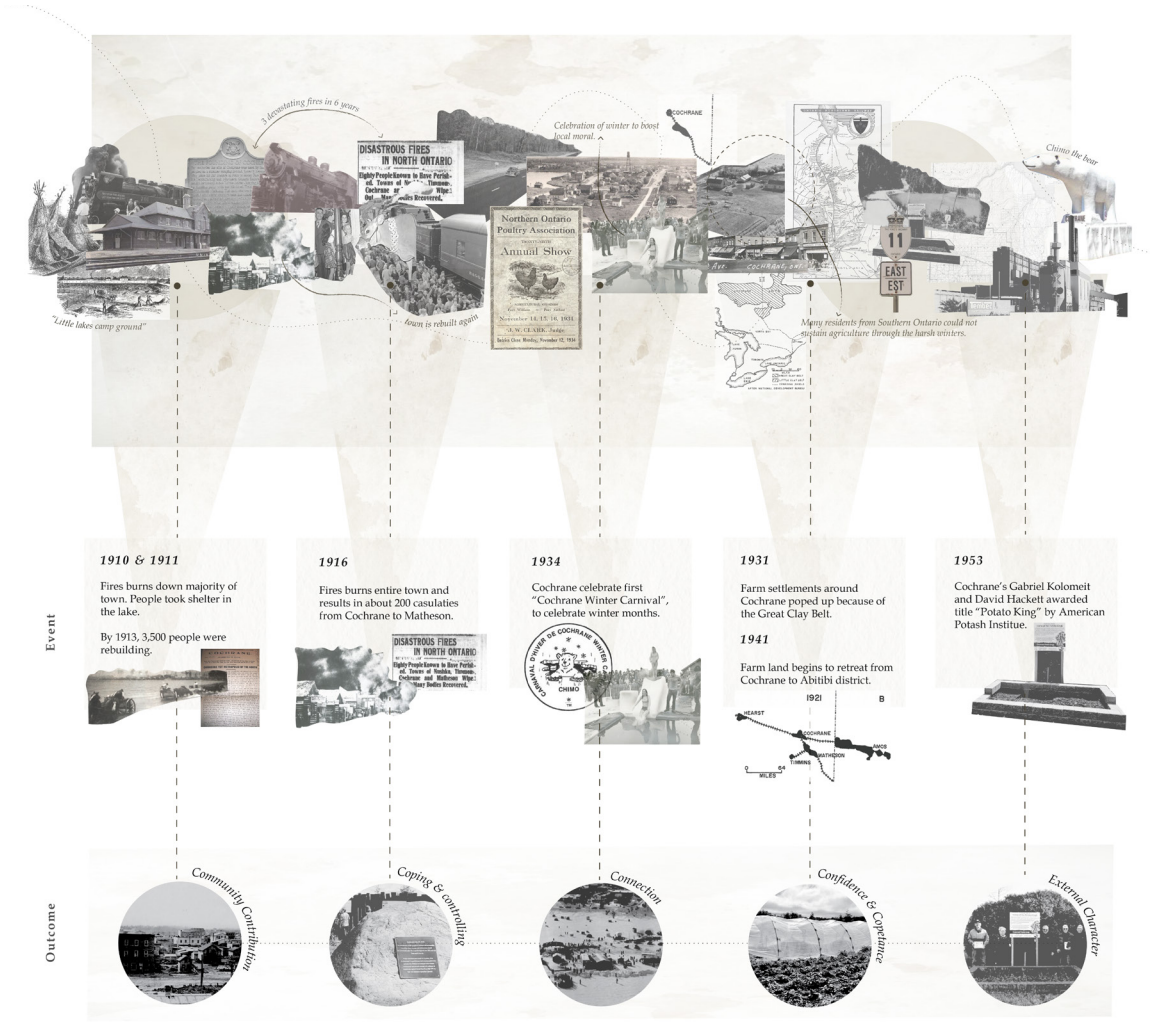


Diagram moments of resiliency in Cochrane's history.

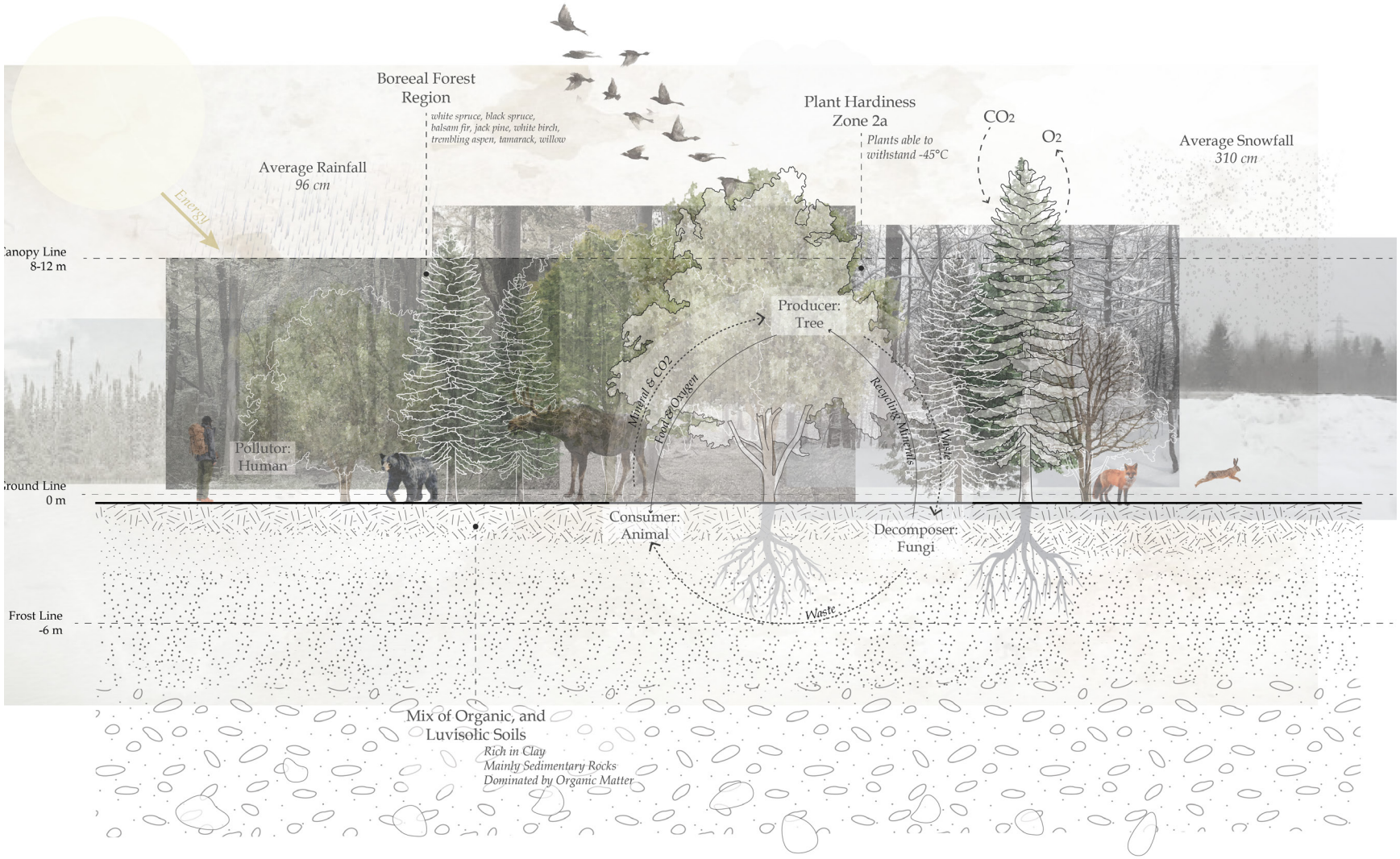
locations as an opportunity to learn and the urban areas as opportunities for access rather than a hindrance, the rural can then thrive and foster resilience for the future.

Chapter 3: Intrinsic Knowledge

The “anthropocentric privilege of our species” stems from a dualistic ecological politics that deprioritizes our dependency and interconnectedness with other living things and our environment (Marshman, Blay-Palmer, and Landman 2019). Humans and consumers have inherent difficulties sharing any goods we create or receive. However, sharing is one of the critical solutions to food security on a rural scale, as intersections between people and generations would distribute knowledge most effectively. Promoting sharing will help fight climate change and foster a sustainable and nurturing planet (Martin and May 2019).

Sharing and Storytelling

Knowledge transfer through sharing is the primary way to create a space that fosters change. Programmatically, a place for education and collaboration from older people to the youth is vital for food sovereignty and security. Additionally, understanding what can be learned from the past is the best way to plan (Martin and May 2019). Only past residents who have farmed on the land understand the climatic challenges and how to overcome them. For example, our grandparents’ generation understands the crop yields in the fall better than us. By opening our eyes and our minds to these opportunities, we see that self-food production is not so unattainable. Sharing inter-generational knowledge will also foster a stronger sense of community and place. Knowledge can be passed on by growing awareness about past and present challenges, leading users to combat food security in an architectural context.



Local ecology in Cochrane, Ontario over a seasonal year.

Sharing space is key to agricultural success, encouraged by a whole community approach. However, bridging user groups that don't usually interact creates potential for long-term success. The key to knowledge transfer is to focus on the benefits of intrinsic knowledge, which is shared intergenerationally. For this reason, the project intends to bring a variety of users of different ages to the program to bridge the knowledge gaps. Intrinsically sharing stories and knowledge of food would ensure users don't rely on monopolized food systems on which new generations depend. To have prosperous food outcomes, people should have enough to survive and prosper through happy frugality (Martin and May 2019).

Reconnection to the Land

Fostering more respect for the land would, in turn, create respect for food sources, the environment, and the earth. Users of the land have lost their wisdom in agriculture; it's all about mass production. If consumers grew their food, respect would be fostered, and a connection to the land would be made - this would ensure the longevity of our ecosystems. The role of food in society and at home is central to every culture, and our lives and countries are linked by food. Food is central to human life, social relationships, and modern discourse (Steel 2020). Sharing or cooking a meal in every culture strengthens relationships with people and food.

Food and land are memory and foster memory; food origins become much more critical through storytelling methods. Storytelling is a valuable aspect of rural places and indigenous communities. Braiding Sweetgrass discusses gratitude and relationships to the land through an indigenous lens and offers wisdom and scientific knowledge about plants

Greenhouse interior render. The greenhouse space can be used for not only year-round food production, but as an event space as well.

and ecology (Wall Kimmerer 2014). Post-anthropocentric food culture has been revolving around excess instead of understanding what is enough (Martin and May 2019). The focus should be on land awareness, perceiving food as a public good available to all. These stories are so important to every generation as they can spark a sense of responsibility for the land. This storytelling will create respect for the land and better food growing and gathering practices.

Indigenous peoples of Northern Ontario, such as Cree peoples, have a knowledge that was neglected for years. By understanding their methods and traditions, a reconnection to the memory of food can be made. We must recognize

indigenous peoples' history, which led to unsuccessful food resolutions in the past. There is a story for almost every food or plant that exists in indigenous knowledge, and learning from native legends is key (Wall Kimmerer 2014). Additionally, indigenous peoples have dealt with food scarcity, and their resilience is represented by their survival off the land for millennia. Throughout Canada, Indigenous groups engaged in diverse land-based practices that used local or regional ecosystems, fluctuating climates, and varying access to resources, "including seasonal patterns of mammal and fish migrations." (Robidoux and Mason 2017). Food is more than a product; it "connects us viscerally to Earth. Food is medicine, and food is the foundation of our health" (Martin and May 2019).

Sitopia: Food Place

Sitopia, from the Greek words sitos, meaning food, and topos, meaning land, "is a way of recognizing the central role that food plays in our lives and of harnessing its potential to shape the world in a better way" (Steel 2020).

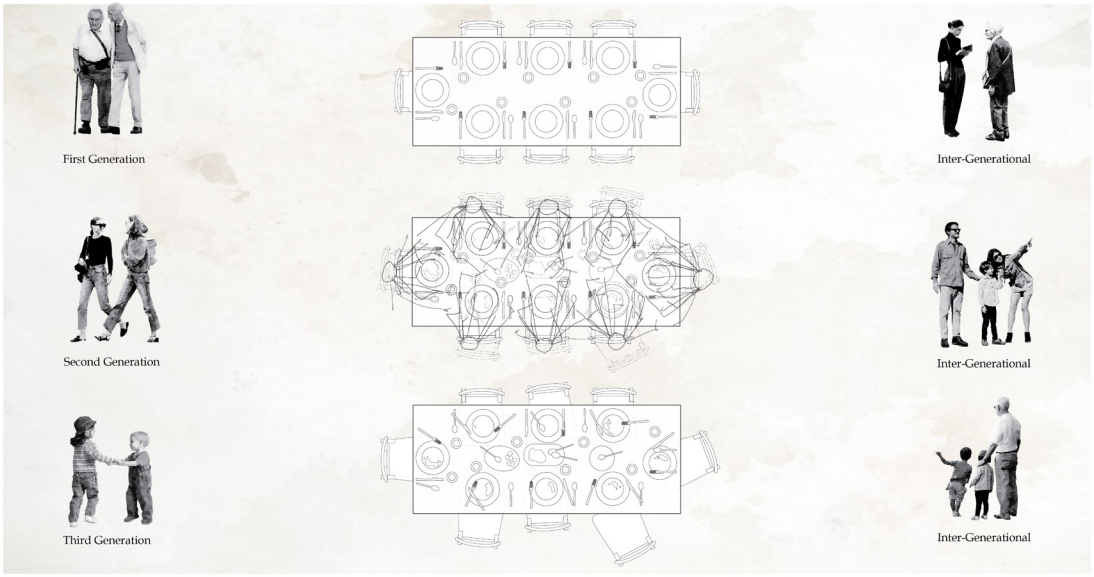


Diagram describing instrinsic knowledge inter-generationally.

Sitopia, in essence, is a way of recognizing the significant role that food plays in our lives and harnessing its potential to better shape the world. Anthropogenic food production has presented many ecological food issues. Steel “fleshes out the many ways balance can be restored and food can contribute to solutions for many of the world’s problems” (Heffernan 2021). Our food concerns do not relate to land concerns, and we should consider the cyclical nature of our agricultural and ecological systems. Furthermore, Sitopia links the ideas of food and place to foster a sense of community and lead to further food resilience.

> Food is used as a central platform to create inroads for understanding these great thinkers, such as Socrates, to conclude as to the nature of the problems we collectively face today brought on by capitalism, neoliberalism, and the endless issues created by these forms of social ordering (Heffernan 2021).

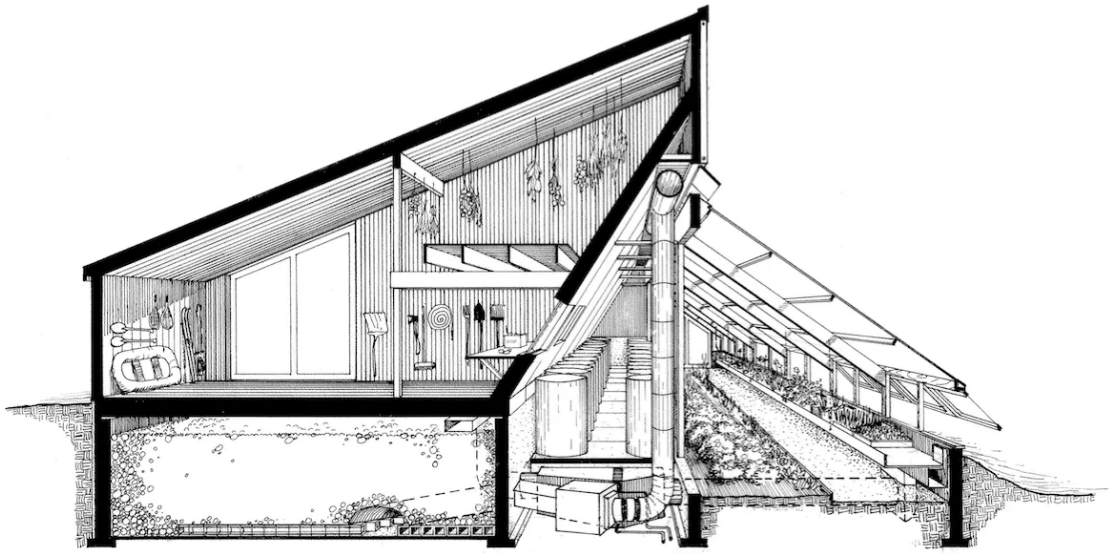
Instead of a challenge food is a lens through which solutions can be addressed. The connection between the city and the countryside (McHarg 1971) is becoming progressively further apart from each other in many ways. Our relationships with food growth can empower people to love the land they live on (Steel 2020).

Chapter 4: Methodology: A Cyclical Toolkit

By using architecture to form cyclical methods through architecture, people's relationship to the agricultural processes will become enhanced, fostering a stronger respect for food and agricultural practices.

Case Study: The Ark, P.E.I

The Ark was constructed in Spry Point, Prince Edward Island, Canada, between 1974 and 1976, designed and built by the duo David Bergmark and Ole Hammarlund of Solsearch Architects. The result was an innovative bio shelter for a family of four, providing the family with a completely self-sufficient living environment that supplies all the food and energy for the building (PEI Ark Catalogue 2016). The Ark employed sustainable building systems and design practices, which we still use today, including solar panels and compost areas. As architecture was becoming



"Section @ Barn, Rockstorage & Greenhouse," Ark for PEI presentation drawing. Solsearch Architects, ink on mylar, dated October 1975. (Mannell 2018).

more eco-conscious and ‘green’ in the 1970s, new emerging sustainability trends were also surfacing in the design world. The Ark was a well-designed piece of architecture and a place that allows symbiotic relationships between people, the land, and their homes.

Architects David Bergmark and Ole Hammarlund, principals of Solsearch Architects, at the southeast corner of the Ark, fall 1976. Photo by Fausta Hammarlund. Solsearch Architects. (Mannell 2018).

> What sets the Ark apart from other sustainable architecture projects, of the 1970s and of today, is a commitment to transforming the lifestyle enabled by the building. Most green building seeks to mitigate the negative impacts of buildings and the lifestyle they support, but accepts without question the lifestyles themselves. The Ark proposed a new relationship between humanity and nature, drawing upon the experiments in living of the1970s counterculture. (PEI Ark Catalogue 2016).

The Ark is an excellent example of how architecture can employ a cyclical toolkit for a building to embrace a natural circular economy. The Ark has many lessons that have stood the test of time that architects can still learn from today. The south-facing greenhouse that makes up a large part of the structure inspired the greenhouse in this thesis design as it uses passive energy techniques such as south-facing windows (Mannell 2018). Overall, the Ark is an emblem of self-sufficient sustainable architecture and how ‘living lightly on the earth’ can benefit both people and the environment.

Traditional Ecological Knowledge (TEK)

Traditional ecological knowledge, known as TEK, describes indigenous knowledge using local tools of a certain area (Watson 2019). Modern practices can learn a lot from this mindset, by considering the positive and successful conclusions of modern TEK architecture. This can result in positive social, environmental, and economic outcomes.

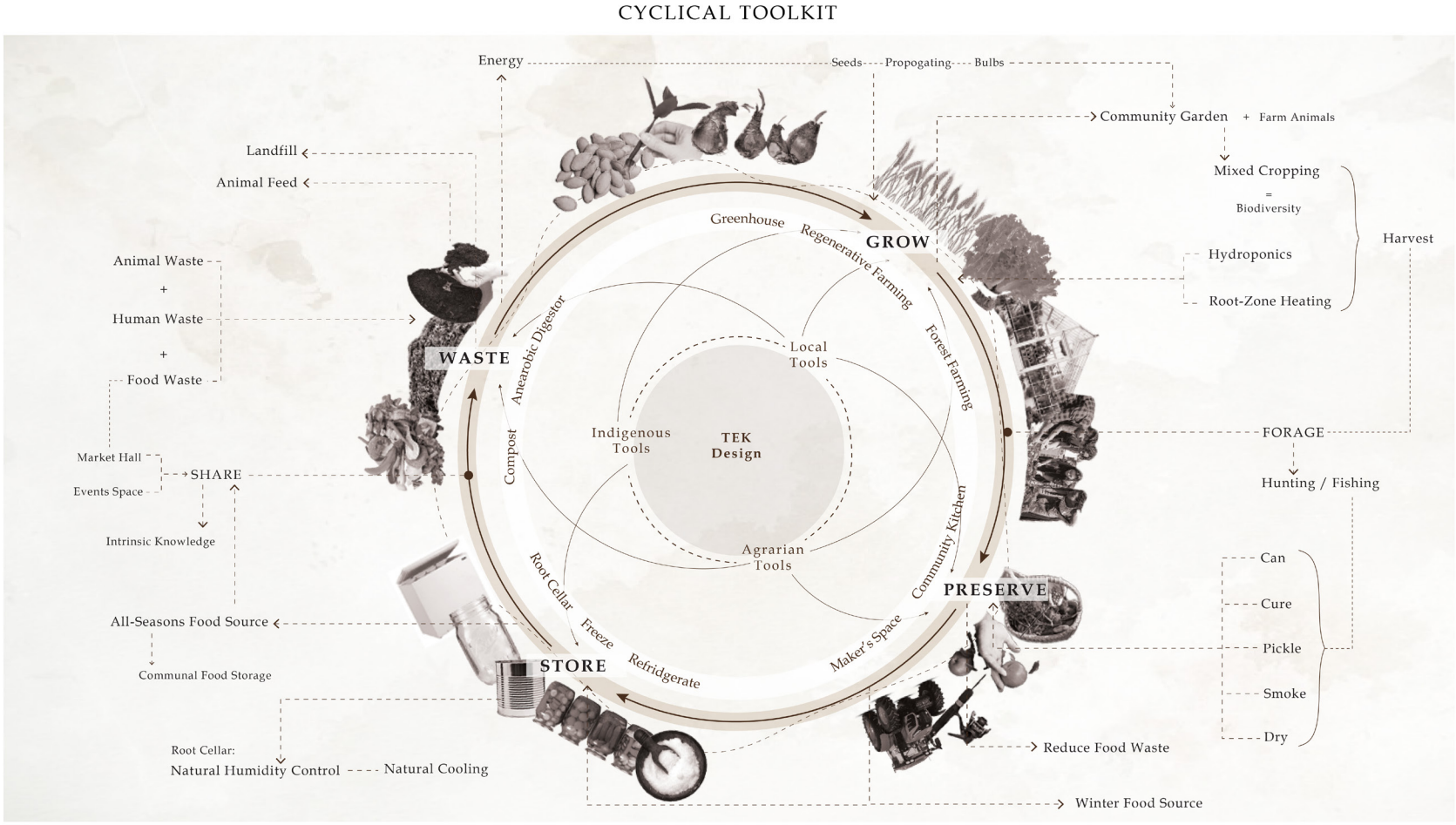


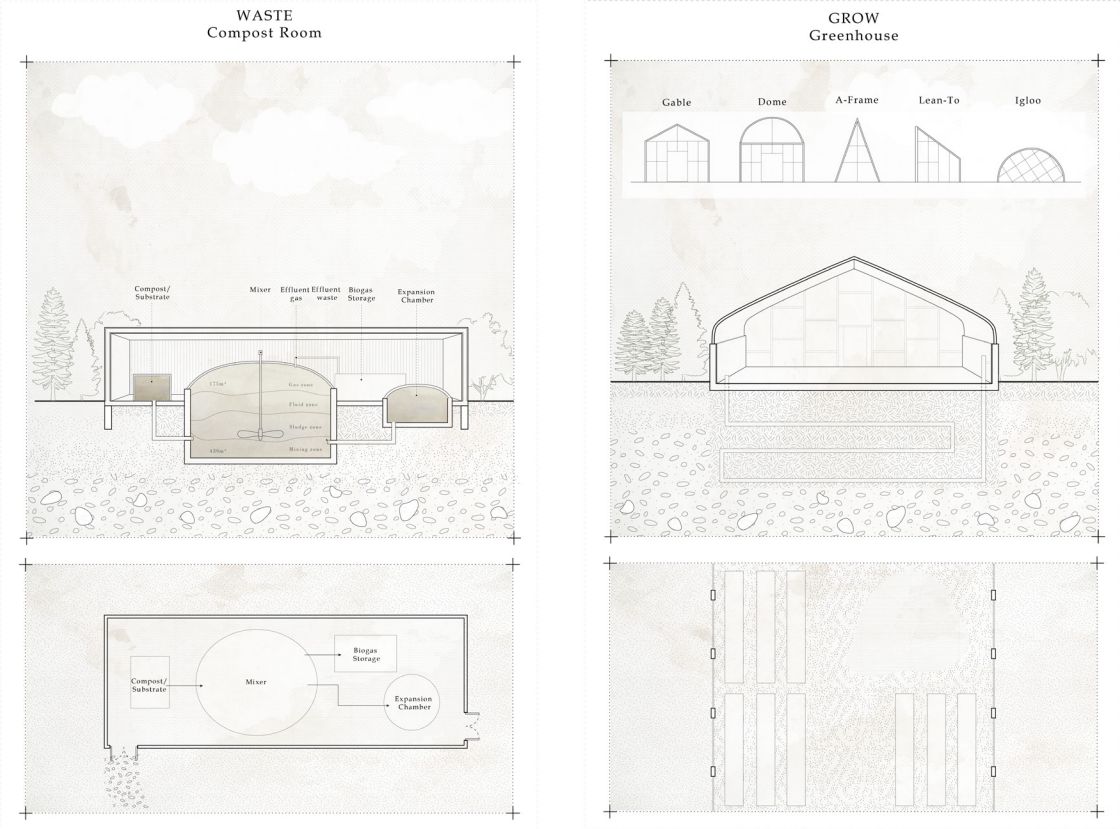
Diagram of cyclical toolkit.

When considering socio-ecological issues, we must look to a whole community approach. This foundational, community-oriented approach is designed to provide a framework to address complex collaborative matters. A WOC approach emphasizes a concept of community that would include the whole biotic community (Marshman, Blay-Palmer, and Landman 2019)—leading to a deeper understanding of how socio-natures manifest and "how engagement with these spaces translates into more integrated, productive, and inclusive communities" (Marshman, Blay-Palmer, and Landman 2019). The community belongs to people inclusivity and seeks to integrate ecological diversity successfully. With the added challenges caused by a changing climate, loss of plant diversity should be at the forefront of ecological concerns since we have yet to determine exact tipping points for environmental breakdown.

We can form a circular economy that encourages food sovereignty by translating local tools into agricultural methods. Methods that continue with harvesting range from growing to storing to wasting. A prosperous circular economy would then loop the outcome of food waste (compost) back into the cycle of growing. Consumers who grow their food would foster a connection to the land to ensure our ecosystems' longevity.

Combining Agrarian, Indigenous, and Local Tools

The combination of agrarian, indigenous, and local tools through building systems fosters a solution for food insecurity resulting from a detachment from food. Agrarian tools include cropping and industrial farming equipment. Today, mono-cropping is a common approach to agriculture but negatively impacts biodiversity (Martin



Systems Diagrams: Grow, Preserve.

and May 2019). Crop producers should consider a cyclical permaculture approach to enhance local ecology. Secondly, looking to indigenous tools to regain balance in food systems is fundamental. Indigenous peoples teach us to reflect on and learn from the experiences of seven past generations and to anticipate our impact on seven future generations (Martin and May 2019). Two-eyed seeing is one significant value that can transform agriculture: using one eye for Indigenous knowledge and one eye for scientific knowledge (Robidoux and Mason 2017). Braiding Sweetgrass discusses how indigenous people try to live off the man while a Western view makes others live off it. By living with the land and fostering respect, we can develop more robust agricultural tools.

Systems Diagrams: Store, Waste

Finally, investigating location-specific tools forms the last pillar of a cyclical toolkit. Local tools are essential to the climatic context of the site, especially in the case of Cochrane, Ontario. As a part of the Great Clay Belt, many people settled in Cochrane District in the 1930s for its potential agricultural value. However, the frontier retreated to Abitibi in the 1940s and 50s, as those from the South could not successfully sustain crops in the harsh climates (McDermott 1961). These people didn't adequately embrace local methods that intersect agriculture and architecture, such as using root cellars for storage or salting fish for preservation. The basis of this closed-loop cyclical toolkit combines these tools using architectural elements, resulting in building systems that will combat food insecurity in various forms.

Grow, Preserve, Store, Waste

Building systems should include functions to grow, preserve, store, and process waste food to create a functioning cyclical program. From a regenerative standpoint, these components allow any farm to thrive. We teach residents how to process food at every step of the cycle.

Growing food goes beyond traditional crops and farming. At a rural scale, this could take the shape of a community garden, fruit guilds, or small-scale crops. However, a greenhouse promotes winter resiliency and makes year-round food yield possible. Apply modern building systems, like a geothermal heat pump, is one of many examples of how temperature can be regulated in a northern climate.

The next step is preservation, to ensure that food can last through the winter months or be kept fresh for an optimal amount of time. Architecture can provide a space for residents to share knowledge about local preservation methods, including curing, canning, pickling, smoking, and freezing.

Storing, another intrinsic step in the toolkit, promotes communal access to food year-round. Traditionally, in Northern Ontario, root cellars are commonly used to store food year-round. This passive building system would take up little space and use the thermal properties of the ground cover to keep the food products temperate.

Finally, processing food waste often needs to be given high regard. However, properly handling food waste is beneficial not only to the land but also to future plants. A compost system is a simple method to dispose of food waste and

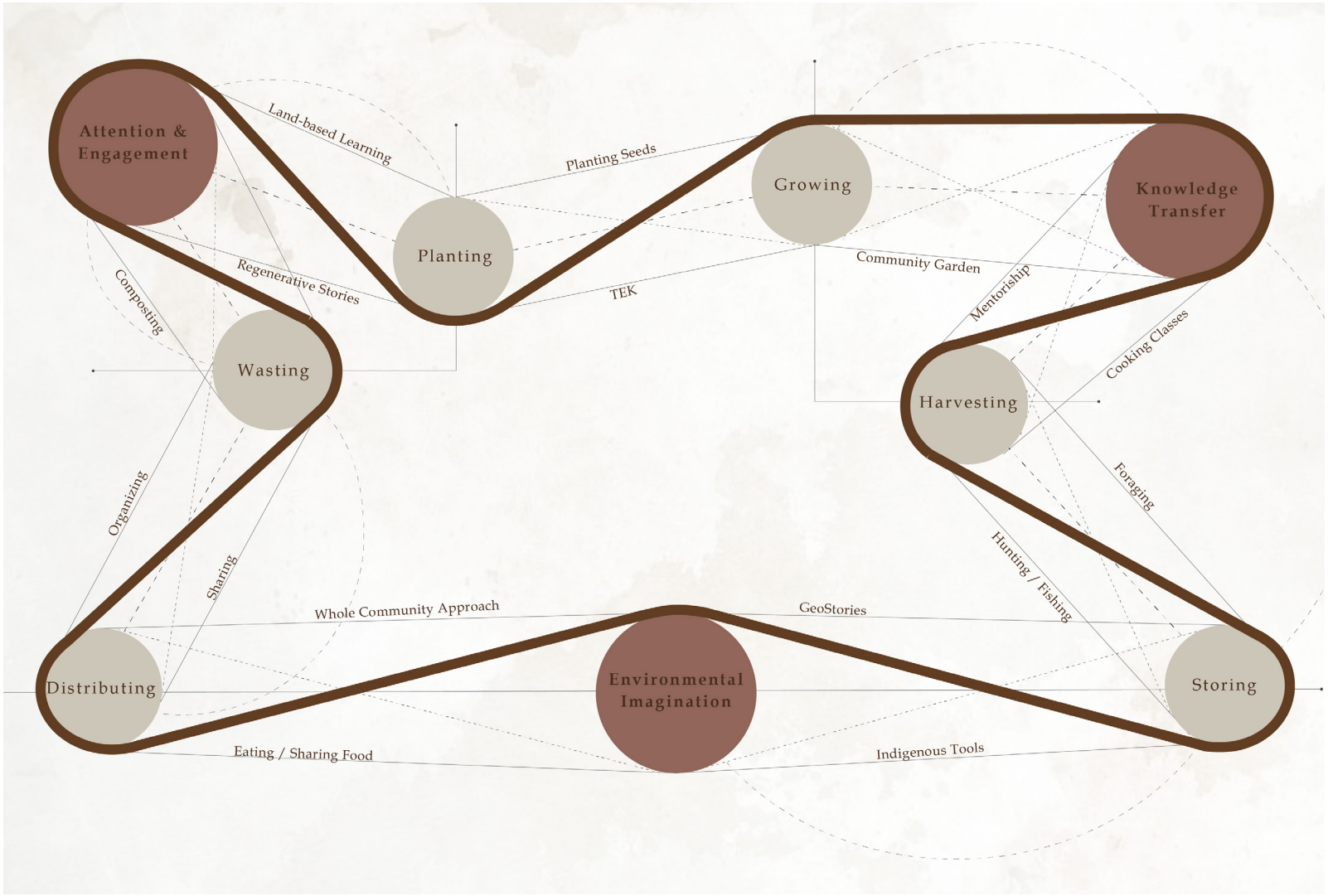


Diagram describing methodology to theory an design.

reuse it for regenerative soil. An anaerobic digestor is an additional building system that can produce food (and human) waste into building energy, potentially heating the building.

Chapter 5: Foodscapes

The intersection of foraging and agriculture is important in creating a design that encourages a whole community approach to traditional ecological design. As it allows local community members more than one option to obtain fresh food and works with local traditions.

Agriculture

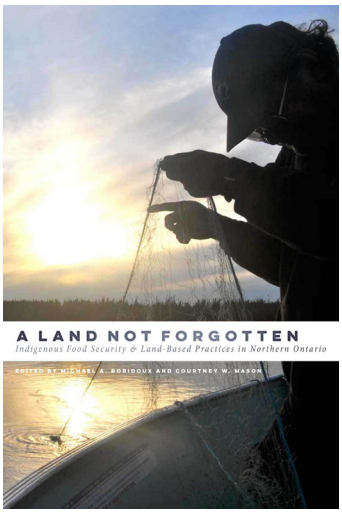
Agriculture is an umbrella term encompassing many agrarian practices, including crop and livestock production. It also encompasses marketing the resulting food products, which today have become highly commercialized in North America. This thesis explores various types of agriculture and growing methods and proposes a combination of practices, including regenerative agriculture and forest farming, to create the most sustainable outcome of food production.

Case Study: A Land not Forgotten

Research projects across Canada have offered investigations into food insecurity in remote or rural locations and provided potential solutions through project-based funding.

A Land Not Forgotten examines the disruptions in local food practices due to colonization and the cultural, educational, and health consequences of those disruptions" (Robidoux and Mason 2017). The inequalities make it virtually impossible to maintain a healthy diet, as grocery store prices are upwards of 50% higher in the North. The Wapekeka First Nations project was developed to increase food yield in this isolated indigenous community.

The Wawakapewin community felt that to increase land-based food harvesting, it was necessary to build a land-based education program, which provided youth with the essential skills to get on the land, learn to hunt, and prepare food as their ancestors had. (Robidoux and Mason 2017) Children were learning from grandparents about the land, allowing youth to acquire the necessary skills in gathering, growing, hunting, and fishing. The teaching stresses ancestral ways to become more self-reliant and sustainable and value cultural practices. Another method was to create a youth land-based harvesting and food preparation course on procuring/preparing wild food and developing a community garden. This project allows communities to implement a more formalized food-sharing system beyond informal networks. Many practices reconnected traditional practices that were lost due to colonialism.



Book Cover of *A Land Not Forgotten Indigenous Food Security and Land-Based Practices in Northern Ontario,* (Robidoux and Mason 2017).

Some other implications of the project include promoting a community garden and offering to teach locals agrarian tools. The project reached beyond food growth and sought to distribute and share food through community gatherings for those who could not collect it themselves. Results from participating communities included an improved capacity to harvest local foods in the wild and from a community garden.

Regenerative Agriculture

Agriculture is undergoing a crisis, and regenerative agriculture prioritizes improving local ecosystems through natural production methods and maintenance. This approach focuses on conserving and rehabilitating the landscape through attention to soil health and integrating a mixed crop system instead of mono-cropping, which has become so common (Giller 2021). The issue is the

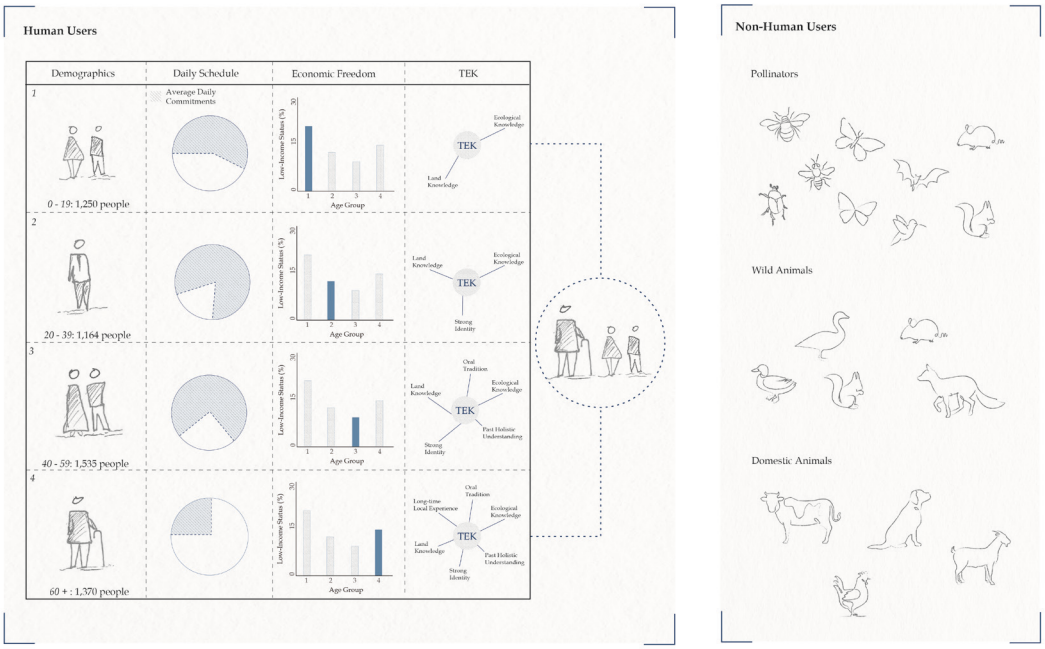
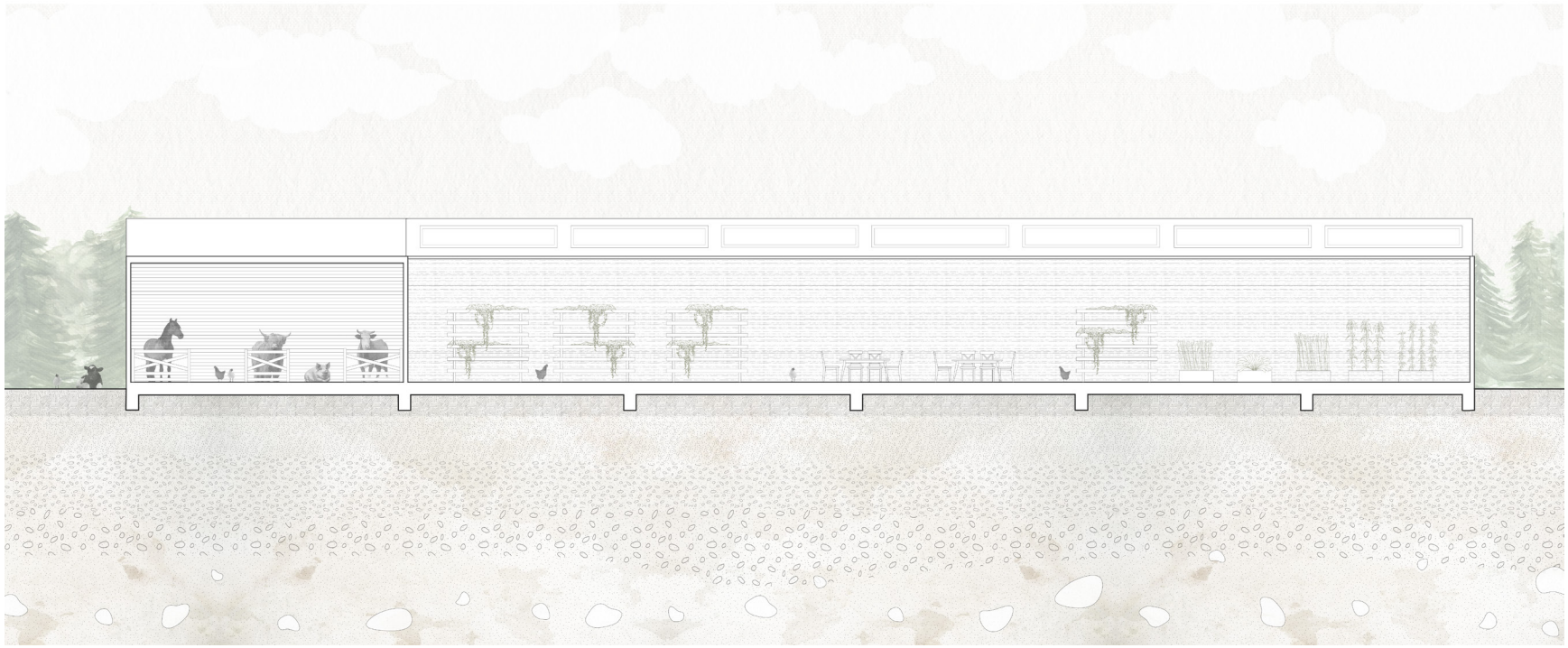


Diagram of users in regenerative farming practices.

current unsustainable global food system practices that abuse the land being used, destroying biodiversity. The term regenerative agriculture began to circulate in the early 1980s when Richard Harwood defined it as

> ... one that, at increasing levels of productivity, increases our land and soil biological production base. It has a high level of built-in economic and biological stability. It has minimal to no impact on the environment beyond the farm or field boundaries. It produces foodstuffs free from biocides.It provides for the productive contribution of increasingly large numbers of people during a transition to minimal reliance on non-renewable resources (Giller 2021).

Regenerative agriculture can be closely linked to crises related to soil health and local biodiversity. This type of farming should maintain ‘low external input’ and focus on biological structuring and integrative farm structuring (Giller 2021). Over the years, farmers have adopted regenerative agricultural practices worldwide as a technique to address climate change issues (Anderson 2019).



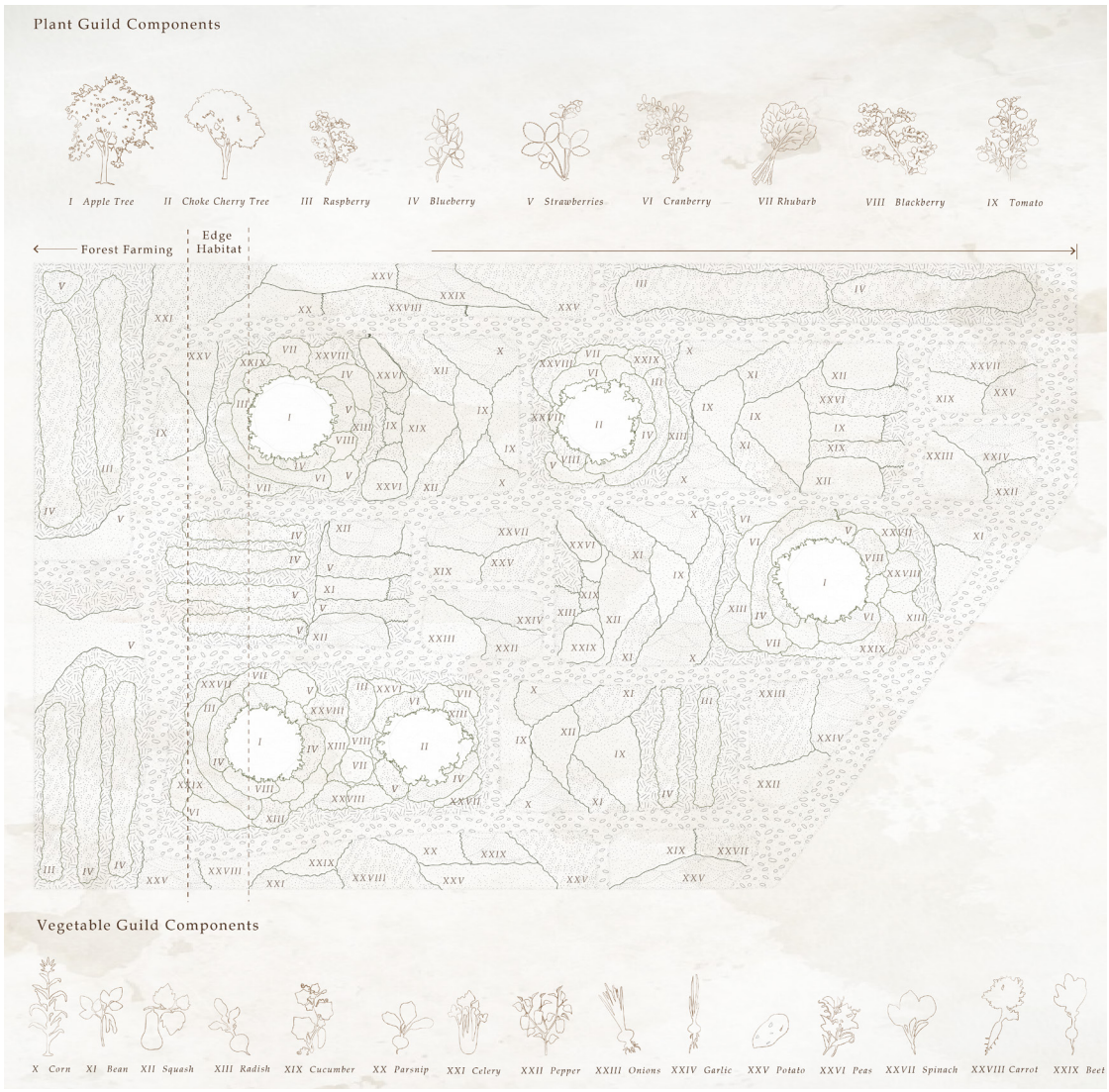
Greenhouse section displaying animals relationship to regenerative farming.

Some principles of regenerative agriculture in the application include minimizing tillage, fostering plant diversity, integrating livestock, avoiding pesticides, and encouraging water purification (Giller 2021). When proposing the integration of regenerative agriculture, it is important to consider the local contexts and traditional farming practices of each region.

In the context of the project in Cochrane, the harsh winter and short growing season should be reflected upon. Regardless, regenerative practices become integral to successful farming practices in this region to increase local food yield for the community. Within the growing area of the project, regenerative practices are introduced to the site, including food diversity, such as fruit guilds and the integration of animals. Many ‘regenerative’ agricultural practices are like local indigenous practices that local people have used for centuries (Anderson 2019). We can reflect upon this comparison while integrating local and indigenous agricultural practices into the project.

Case Study: FarmED, UK, Timothy Tasker Architects

Located in the Cotswolds, a region in central England, FarmED “works to educate communities on the role of regenerative farming in combating climate change, a mission that extends to the architectural aspiration and execution of three highly efficient mixed-use buildings on site” (Connelly 2021). Timothy Tasker Architects designed this project for owners and clients in 2018, combating toxic trends of farming today, such as mono-cropping. The site combines several building systems and programs, providing spaces for growing food, eating food, and educating others on food production. The formal design of the complex follows a U-shaped layout, forming a central courtyard. The



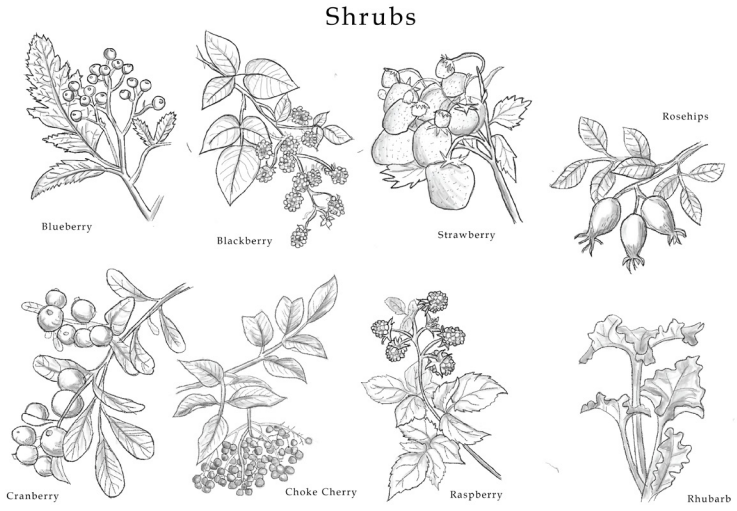
Planting Scheme for main site. Mixture of regenerative agriculture and forest farming.

material and form of the project are modeled after traditional agricultural buildings of the Cotswolds, implementing pitched roofs and local timber cladding. This project respectfully focused on an ecological and environmental approach, working with the clients to use local environmental data and sustainable research to produce the design (Connelly 2021). This project embodies regenerative agriculture and architecture and celebrates local craftsmanship and methods. It is a notable example of what the future of farming

could be. About my thesis proposal, this precedent exhibits similar values and goals theoretically. Formally, FarmED is a working example that supports a framework similar to the one previously presented, proving it could succeed today.

The Three Sisters

One method of increasing the biodiversity of farmland is through the three sisters' crop system. The three sisters are corn, beans, and squash because they nurture each other like family when planted together. The three sisters crop model is a form of companion planting that consists of growing corn, a tall crop, to act as a pole for the beans that are planted around them, as well as adding nitrogen to the soil to help the other crops (Agriculture and Agri-Food Canada 2021). Finally, the squash is planted around these crops; the large leaves provide ground cover and retain moisture in the soil (Parks Canada Agency 2024). For millennia, this ancestral indigenous crop system optimized the potential and value of food.



Local foraging guide for shrubery.

The main benefit of the three sisters is reducing the risk of pests such as rabbits and bugs eating the crops (Agriculture and Agri-Food Canada 2021). Also, the varying plants increase soil health and biodiversity of the area, a central pillar of regenerative agriculture. In terms of health, these plants are all high in antioxidants, have a high nutritional potential, and are used in cooking. Various crop types can be swapped out for each sister based on climate and need. For example, corn varieties include white and blue corn, bean varieties include climbing beans, black beans, and red beans, and squash varieties include pumpkin, butternut squash, and zucchini. These crops are mainly harvested in the fall months (Parks Canada Agency 2024) but can be stored and preserved to be eaten all year round. Overall, regenerative agriculture can occur in any rural community by merging agrarian tools with indigenous methods.

Forest Farming

Forest farming, in practice, is the cultivation of high-value crops that are not trees in a forest. These crops are protected by the existing forest and tree canopy (Mudge 2019), emphasizing biodiversity and local sustainability. This farming approach uses horizontal and vertical spaces and the interaction of plants to foster a healthy microclimate. These crops, which humans can plant or are already growing, are called non-timber forest products (NTFP) (Mudge 2019). Forest farming is unique to each forest or microclimate in which it exists. The boreal forest microclimate is the forest typology considered for this thesis proposal. Forest farming goes beyond crop cultivation and can be established to restore a forest ecosystem, forage, and manage NTFPs.

Image of Eastern White Cedar in Ontario Boreal Forest. (Government of Ontario 2023)

In the microclimate that exists in this context, many edible plants, fruits, vegetables, and medicinal herbs can be cultivated and planted in the practice of forest farming. In this case, this includes mushrooms, such as Chaga and oyster, berries, like blueberries and raspberries, syrups, from birch and maple trees, and shrubs, like rhubarb and fiddleheads.

Forest farming provides many benefits to existing ecosystems and introduced crops, it enforces ideas of companion planting and controls climatic conditions.

> The forest canopy provides multiple ecosystem services, which include protecting and regenerating soils, restoring aquifers, controlling floods and preventing drought, as well as supporting biodiversity. In forest farming systems shade is paramount (Mudge 2019).

Furthermore, forest farming supports sustainable practices as it utilizes existing landscapes and does not require cutting down trees to make room for field crops. The types of forests across North America are expansive, and agroforestry practices could build upon existing ecosystems (Mudge 2019). Many ecological benefits exist within forest farming, but it also promotes social education and change. Forest farming promotes conservation and public education, creating a space where children and adults alike can learn about these alternative agricultural practices.

Foraging

The intersection of foraging and agriculture is important in creating a design that encourages a whole community approach to traditional ecological design. As it allows local community members more than one option to obtain fresh food and works with local traditions.

In rural communities, integrating hunting and gathering food options into local economies is fundamental to encouraging

resiliency and upkeep of indigenous traditions. This thesis additionally proposes additional symbiotic sites with a program revolving around foraging. Just north of the Curling Club are the local cross-country ski and snowshoeing trails, more than 50 km of trails used in summer and winter. The trails exist within the boreal forest, which boasts endless opportunities for harvesting wild food, such as mushrooms, berries, and medicinal herbs.

Chaga growing on birch tree in winter. (North Spore 2024)

Foraging Guide for Northern Ontario

Ontario forests are an incredible landscape in which to explore foraging practices, as they boast an extensive range of nutritious edible wild plants (Ontario Nature 2017). When exploring harvesting practices, it is important to practice sustainable harvesting and caution to ensure the wild plants are not harmful.

“Improper harvesting techniques and overharvesting can have a significant negative impact on the ability of a species to reproduce. This practice can lead to the disappearance of a species from an area and the loss of a local food source, affecting humans and other species. A general rule is to collect only 5 percent of any individual patch of a given species within a maximum of 25 percent of an area.” (Ontario Nature 2017).

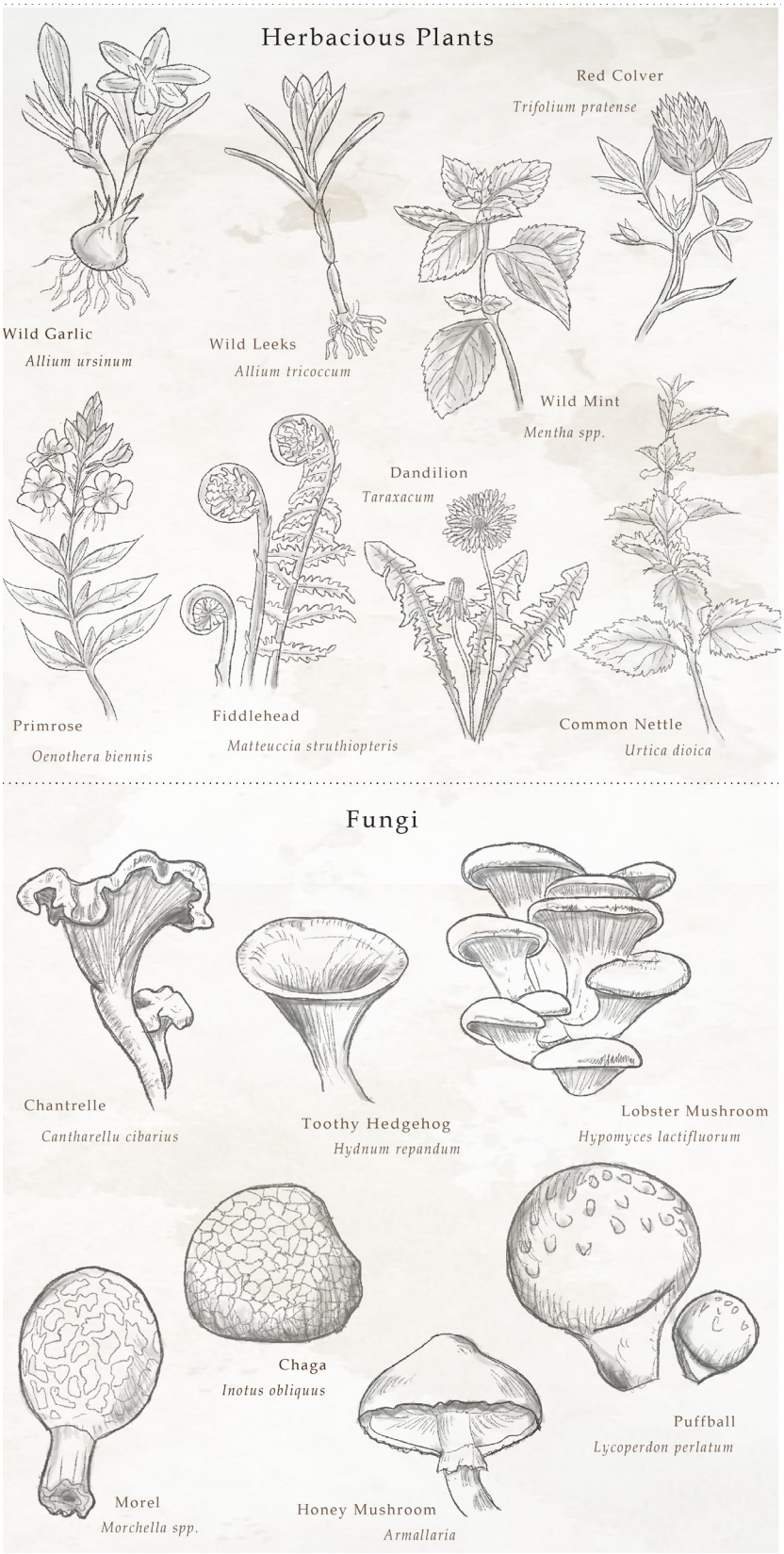
Harvested Chaga mushroom. (University of Minnesota Extension 2021)

When done safely, foraging has many benefits, such as creating stewardship for the land, but foraged foods are typically higher in nutrients and antioxidants than mass-produced crops (Ontario Nature 2017). This is due to the lack of pesticides and additives in natural food. Foraging in Northern Ontario also promotes a stronger relationship with the land and people, as many hunting and gathering practices were passed along through indigenous and local

knowledge. For example, spruce tip tea is a ubiquitous medicinal and traditional form of food foraging in the Cochrane District. Cree culture, cedar tea is a common medicinal and nutritious way to incorporate wild foods into our lives. When drank as a tea, cedar (maaschiisk) can reduce fevers and relieve flu symptoms (Cree Health 2023).

> A recipe for cedar tea:
>
> 1. Collect cedar branches following traditional protocols.
> 2. Place 2 cups of fresh cedar into a large pot with 8 cups (2 litres) of water.
> 3. Bring the cedar to a boil and keep boiling for about 10 minutes until golden and you smell the aroma throughout your home. T
> 4. Take big calming breaths, breathing in the steam. You may also place in a bowl to directly breathe in the steam.
> 5. Once boiled, remove pot from heat and let liquid cool.
> 6. Strain cooled liquid into another clean container.
>
> Once strained, it is ready to be warmed up to drink as tea, adding honey, maple syrup or other sweetener if you like. It is best to drink it warm. You may continue this procedure as long as you wish (Cree Health 2023).

This project consists of a foraging guide has been created for this thesis that outlines fungi, herbaceous plants, shrubs, and trees that are regional to the Cochrane area. The most common plants foraged locally include blueberries, wild strawberries, wild mint, fiddleheads, mushrooms, and dandelion leaves. It is essential to note the seasonality of foraging techniques in regions with harsh winters, such as Cochrane. In most of northern Canada, wild plants become scarce in winter as snow covers the forest floor. However, some resilient plants still thrive during -40°C temperatures. Chaga mushrooms are one of these plants that can be consumed naturally, but tea is the most common method of



Foraging Guide: Herbacious Plants and Fungi. Data Source: Northern Forest Foraging Guide. (Ontario Nature 2017)

consuming these fungi. Chaga typically grows in the boreal forest, is commonly found on the trunk of birch trees (which also provide us with syrup in the winter), and resembles charcoal (Lloyd 2018). The best time to harvest chaga is during the winter months, and it has many medical benefits, such as boosting energy and improving immunity and liver health (Lloyd 2018).

Combining these foodscapes and implimenting them in the project would allow for a suplimentary food yield for the whole community. The short-term goal of this guide is to increase food yield for the local community and the long-term goal to create enough yield to export food to other nearby communities.

The growing components presented intends to create further awareness of foraging practices and pass down ideas of wild cultivation for future generations.

Chapter 6: Design Outcomes

Main Site: Agro-Food Hub

The methodology for the design of the architecture across sites was established through the local foodscapes. The project establishes a communal approach to design to be inviting to all users and provoke rural resiliency (Thorbeck 2016). The program was formed around the cyclical toolkit previously presented, to include elements of growing, preserving, storing, and wasting. This materialized in a large-scale greenhouse, supported by a compost area/ anaerobic digestor, a market hall that can be expanded upon the original curling club, a maker's space, a café, and

Exterior render of entrance to main site's agricultural area and market hall in the Spring. Existing Curling Club is on the right and new design proposal on the left.

above and below-ground storage areas; all for the local community to share and use. These spaces are connected through architectural elements and agricultural programs.

Exterior image of FarmED site and crops (Crocker 2021).

Regenerative agriculture can intersect with the theme of regenerative architecture. Regenerative architecture, in our case, is the culmination of regenerative farming and design. It can be defined as architecture that focuses on conservation, with an overall goal to reduce ecological impact and to positively impact the environment (Littmann 2009).

Program

Programmatically, each space flows into and out of one another and blurs the lines of social and formal spaces. Each space inhabits various seasonal attitudes throughout the year, enforcing themes of adaption and change, like themes presented in the foodscapes.

Interior image of FarmED and FarmEAT, pizza space and dinning hall (Crocker 2021).

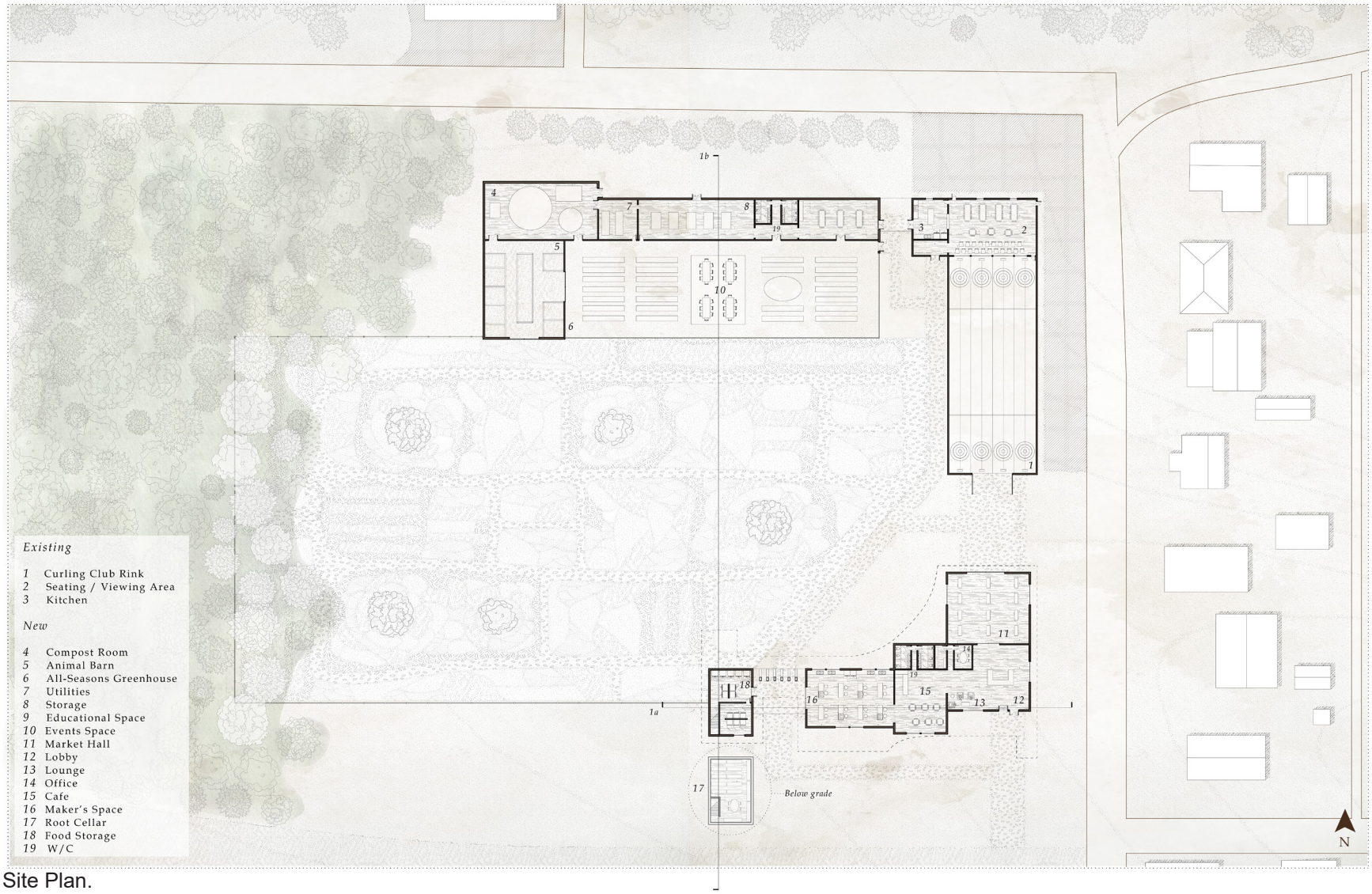
To begin, the greenhouse sits on the northern edge of the site. This expansive lean-to greenhouse sits on the northern part of the site facing the southern sun, to collect the most passive energy possible while protecting the rest of the site from harsh north winds. The structure is sandwiched between the existing curling club and the new proposed animal barn, to integrate grazing animals to support regenerative farming. The back-of-house program attached to the main greenhouse includes utilities, food storage, and more importantly the compost area fitted with an anaerobic digestor. In terms of building systems, the greenhouse is fitted with operable glazing elements and heated through a geothermal heat pump. Additionally, the greenhouse supports many growing systems, a mixture of hydroponics vertical growing systems and root-zone heating systems

(Hoidal et al. 2022), to optimally grow food year-round. Most intrinsically, the space within the greenhouse provides shelter and an event space to share a meal with others, promoting the distribution of intrinsic knowledge.

The remainder of the programmatic elements dissipate in the south region of the site, forming a U-shape to create privacy as well as funnel users to the middle section which is mainly used for growing food in the summer months.

The curling club's ice area is often covered and transformed into a farmer's market in the summer months when it is not in use. To expand on this program, the Agro-food Hub's market space for local vendors transpires off this space on

Interior collage of Maker's Space in the Fall.


1b
1a
Below grade
N
Existing
1 Curling Club Rink
2 Seating / Viewing Area
3 Kitchen
New
4 Compost Room
5 Animal Barn
6 All-Seasons Greenhouse
7 Utilities
8 Storage
9 Educational Space
10 Events Space
11 Market Hall
12 Lobby
13 Lounge
14 Office
15 Cafe
16 Maker's Space
17 Root Cellar
18 Food Storage
19 W/C

Site Plan.

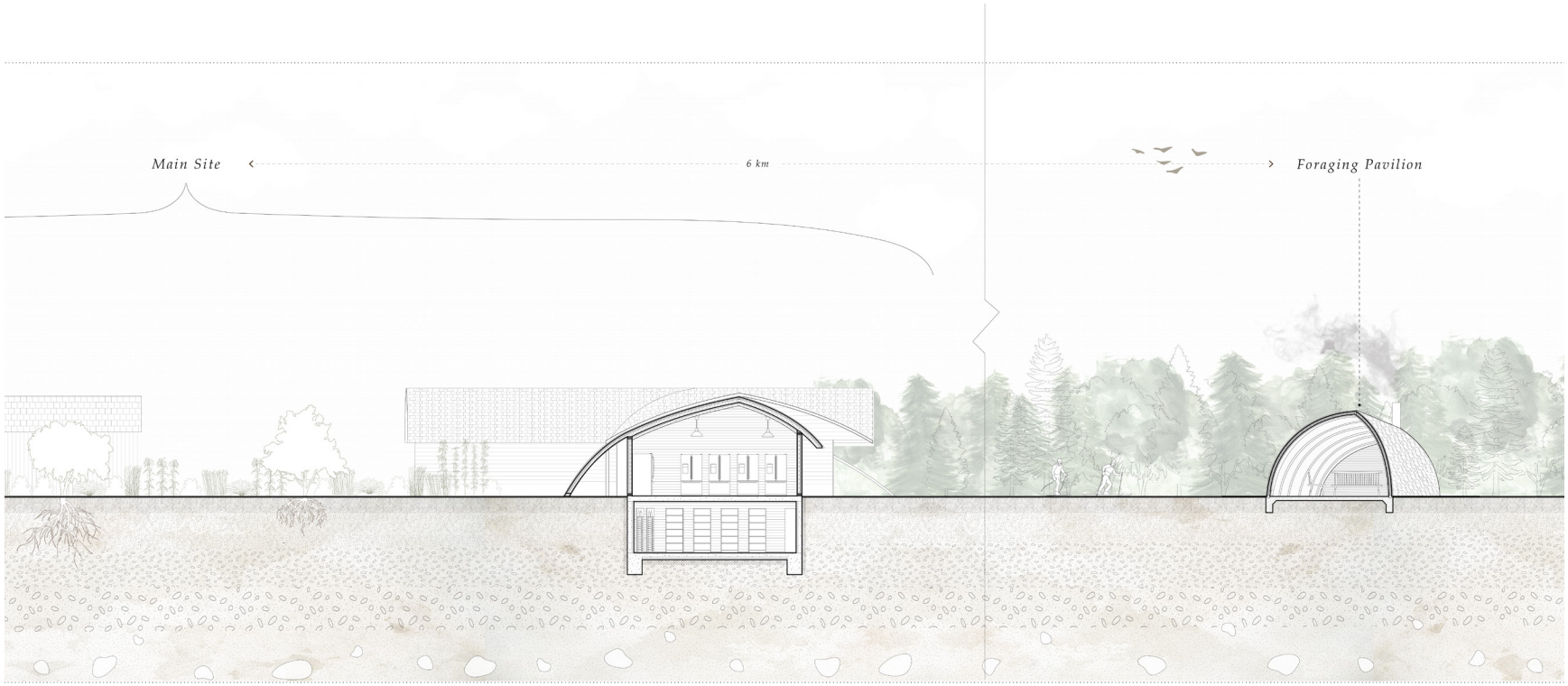
the East edge of the site. This decision bridges the form and the program of the new and old structures. The market hall is equipped with sliding doors that can open the space in the summer and protect it in the winter, as adaptability is important in a rural landscape (Thorbeck 2016).

This space is adjacent to the lobby and educational space where users first enter the building and site. This space is a place for locals to lounge and pick up or drop off contributions to the project.

This feeds into the farm-to-table café, where all users can come to enjoy new gastronomical experiences created from grown produce and foraging findings. The maker's space is mainly used to transform food to be preserved using various techniques. Some of these techniques include but are not limited to pickling, canning, dry and cold smoking, jarring, jamming, and curing. Many of these techniques have been introduced to the community through indigenous knowledge and migrants.

Finally, an external space is created solely for food storage. The above-ground food storage is mainly for freezer and refrigerator use, for both the site and for other people in the community to rent and use year-round for a reliable food storing area. Below ground, exists a root cellar, commonly used by indigenous groups in Northern Ontario, where most of the products that have been preserved can be stored, such as jams or dried fish. A root cellar is an asset to any farm (Department of Agriculture 1940) and works by regulating the internal temperature based on seasonal ground temperature surrounding the structure – keeping produce cool in the summer and winter. Once this food is consumed in the community or on-site, it can be returned to

Site Section describing transition through the community to the site. This drawing illustrated the architectures relation to the rest of Cochrane.



Section 1b: cutting through regenerative farming area, storage building, and foraging pavilion amongst the forest.

1b: SITE SECTION

Section cutting through township, town center, and greenhouse on site.

Site section running through train station and township, displaying the main transportation hub of Cochrane.

the earth through composting and used in the local soil to grow new crops for the future. Informing the cyclical nature of the program.

Form

The form of the project follows a design methodology balancing the program and existing foodscapes. The overall massing approach is like the method of foraging, when one collects, cuts, and covers their food findings. The program was collected based on similarities, cut to refine the spaces, and covered, by an overarching roof structure. These gestures were refined through design by conjoining the process with vernacular architecture.

Winter

Exterior render of entrance to main lobby site in the Winter.

1a: SECTION
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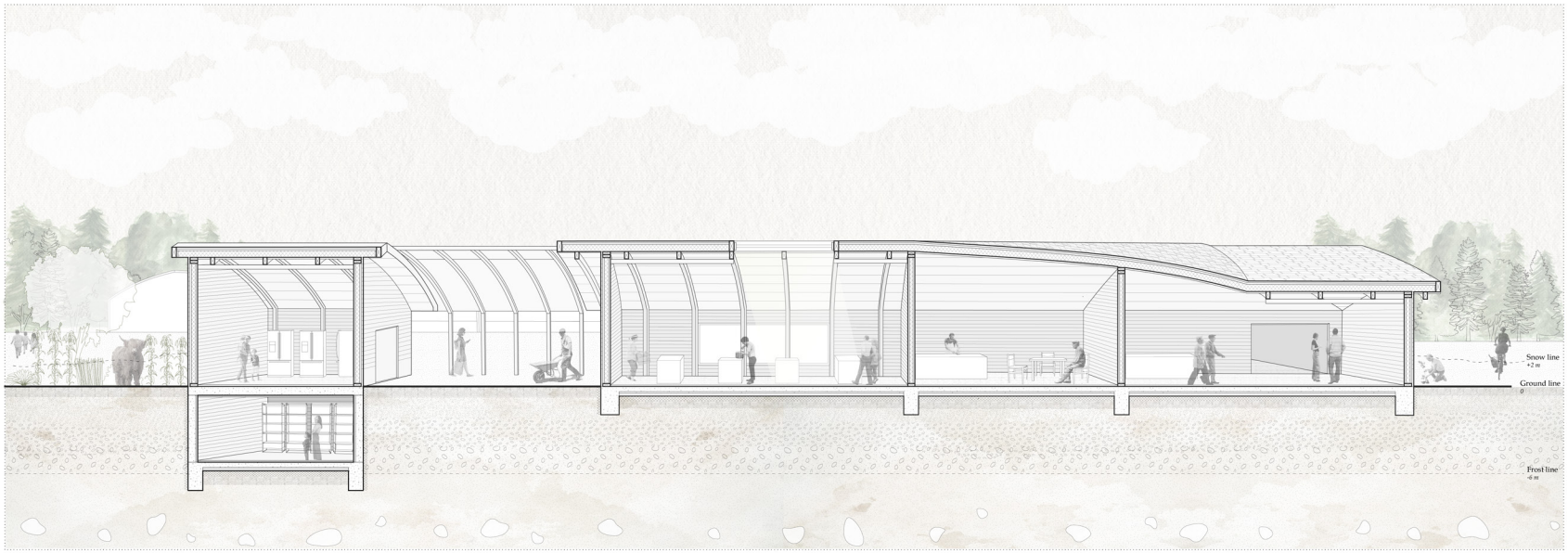
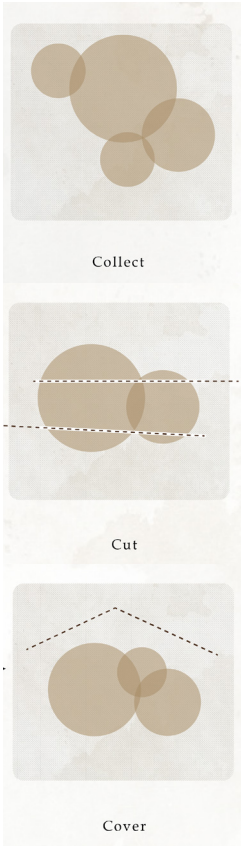


Section 1a, cutting through main lobby, cafe, maker’s space, and storage.

This resulted in the use of a bow-gable roof structure, inspired by local and agrarian design techniques. The roof structure was important not only to formally tie all the programmatic elements together but also to take a modern approach to aged design techniques. The roof's form takes inspiration from both traditional Cree long houses (Gadacz 2007) and gothic-arch agrarian barns. The form of the buildings in this complex was distributed based on local climatic conditions. Similarly, these structures, use a curved roof formed based on local material as it creates a strong resistance to snow loads and wind (Holt 1935). Creative liberty was taken for the final roof form, to ensure optimal coverall over all programmatic elements, resulting in the current design presented. Overall, this lightweight and affordable technique displays the use of local methods and materials.



Methodology Parti.

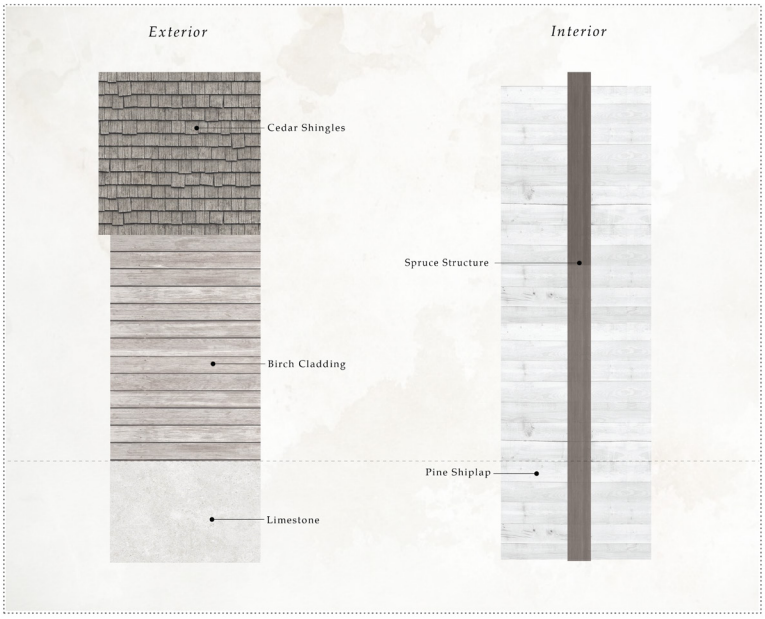
Material

In terms of materiality and structure, the project focuses on using natural and local sources such as wood and stone. More specifically, the structural elements of all new buildings would implement white spruce for the supporting structure, such as the Gothic arch frame. Furthermore, the exterior materials consist of naturally treated cedar shingles for the roof, a lightweight and local option. The walls would then be cladded with white birch siding and limestone on the bottom meter of the building's exterior, to protect it from snow drift. The interior would feature white birch shiplap to clad the interior walls and contrastingly the exposed spruce structure, stained deep brown. All these natural materials can be sourced locally from quarries and lumber mills. Promoting themes of sustainability as one day, they can all return to the earth, completing another cyclical process.

Application

The application and combination of local architecture and foodscapes produce a successful framework to reshape the misconceptions that producing one's food is unobtainable. The combined interior and exterior grow space of the project would produce enough food yield to feed the whole community. Supplementing their current diet and providing alternative food sources besides the monopolized grocery stores. The goal of this thesis is not to combat or replace commercial grocery stores, but to provide people with the knowledge and awareness of food production and how simple it can be.

The greenhouse measures 1,200 m2 but can grow up to 3,600 m2 of produce when using the vertical space as well. While the exterior growing area accumulates to 3,500 m2, a total of about 7,100 m2. The growing space on this site alone could feed almost 800 people full-time, or 2,500 people part-time in the first year. This is calculated using the metric of 9m2 / person since this is the minimum



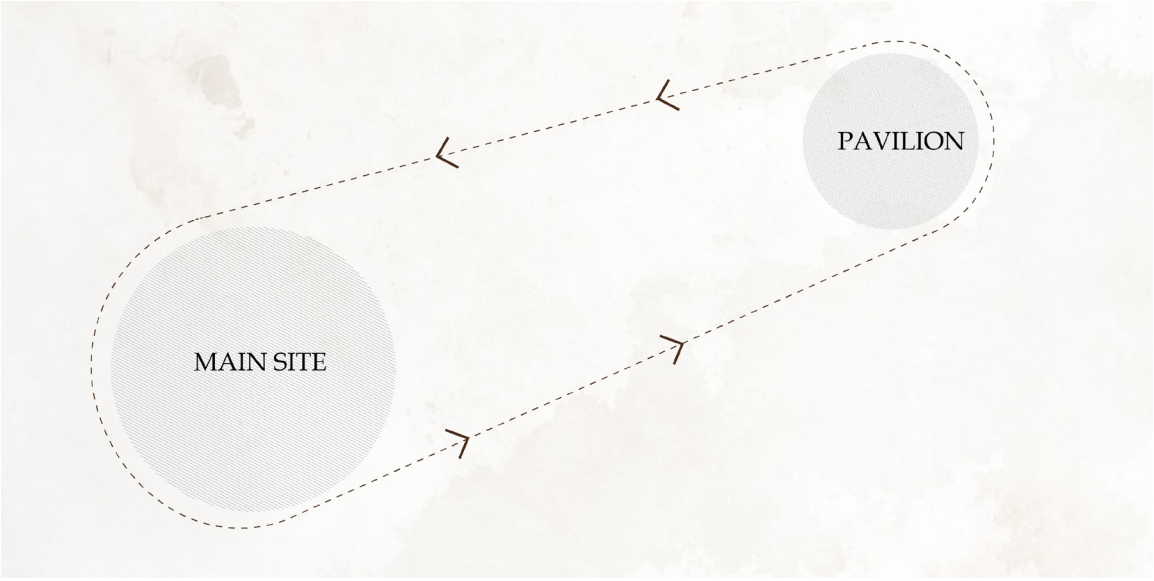
Exterior render of entrance to main lobby site in the Winter.

amount of growing area needed inside or outside. Once food production has established a healthy crop system in 2-5 years, this space would be able to supplement nearly the whole population's diet with fresh or preserved produce. The project has a short-term goal to increase food yield for the local community as well as a long-term goal to export food to other nearby communities.

The application of architectural methods for the development of the main site would inform the design of the foraging pavilion. The foraging pavilion plays a significant role in re-introducing lost traditions of hunting and gathering, that are intrinsic to rural communities across Canada.

Foraging Pavilion

Foraging significantly affects food distribution in many rural areas across Canada. This thesis additionally proposes a satellite site with a program revolving around foraging and methods of the hunter-gatherer. Adjacent to the leading site are the beginnings of more than 50 kilometers of trails used



Parti: Design influence between main site and pavilion.

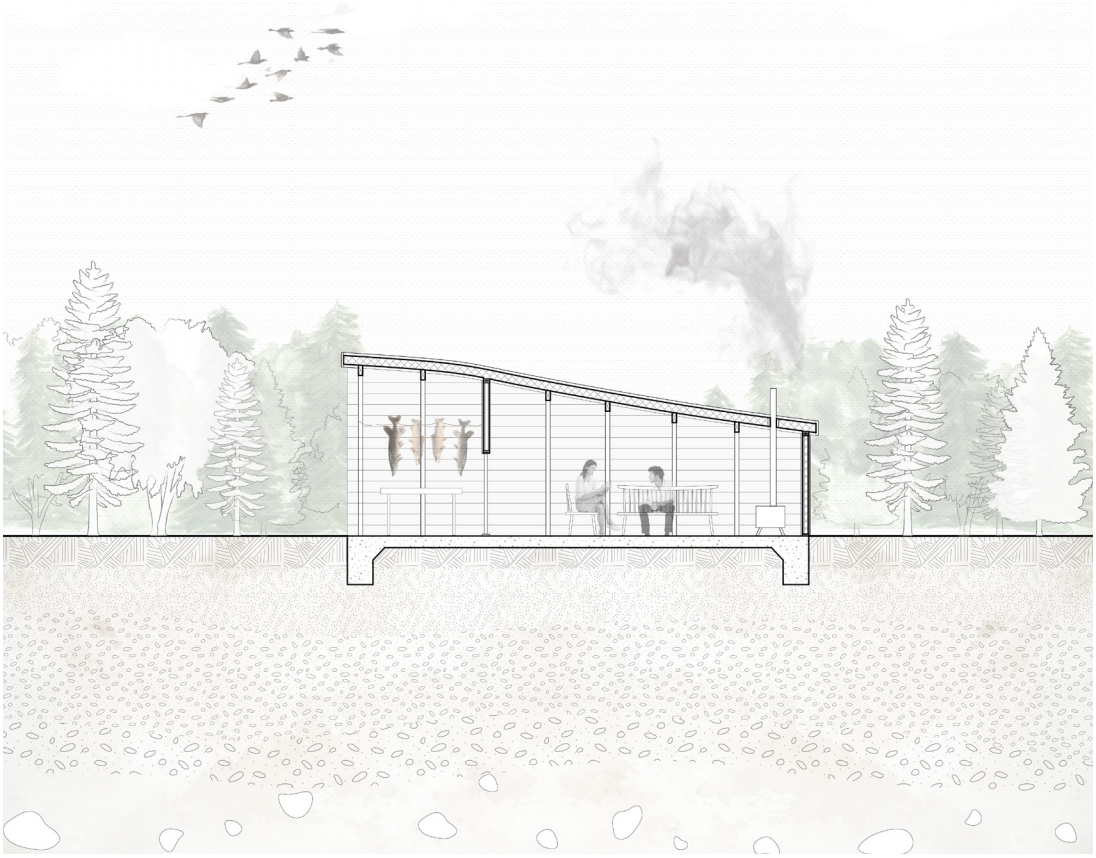
Diagram of journey to foraging pavilion. Illustrating the existing cross-country ski and snowshoe trails on site.

in both the summer and winter. These frequented trails are for local cross-country skiing and snowshoeing in the winter months. In the summer, they are used as walking or hiking trails on the edge of Cochrane. The trails within the boreal forest feature a healthy ecology and biodiversity of flora and fauna—boasting endless opportunities for harvesting wild food, such as mushrooms, berries, and medicinal herbs. Foraging pavilions within the maze of trails allow people to clean, cut, and cover what they've collected, keep warm, and share a meal.

Site map of agro-foodhub and potential foraging pavilion locations.

Foraging Pavilion in plan.

The intersection of foraging and agriculture is essential in creating a design that encourages a whole-community approach to traditional ecological design. It allows local community members more than one option to obtain fresh food and work with local traditions. The foraging guide for Northern Ontario, which was previously presented, could safely guide beginners to forage the boreal forest for wild food options. The pavilion's role in the project is as important as the main site's architecture, as it bridges a current gap between people and the land.



Foraging Pavilion in section.

Each structure’s design approach and outcome have informed each other through the design process. Each site’s form, material, and program support one another and work symbiotically. The pavilion design can be repeated in the landscape, creating resting and refuge areas along the trails. Like the roof structure of the Agro-Food Hub, the form employs a gothic gable that reaches into the earth, easily repelling snow and wind. Clad in cedar shingles, the pavilion’s exterior seamlessly blends into its surroundings, nestled between the birch and spruce trees. The space is split between exterior and interior, depending on the coverage needed during various times of the year. The interior is a minimal space with only a wood oven and a dining area. The pavilion provides a place for users to stay warm, organize their food findings, and share a meal.

Foraging pavilion model. Photographs.

Chapter 7: Conclusion

This project emerged through my passion for sustainability and food. Analyzing today's food systems led to the discovery of disproportionate food access and raised accessibility concerns. Combining facts and personal experience resulted in the methodology presented in this thesis. Although urban foodscapes are essential for most populations, remote and rural communities are often not prioritized, even though these townships work symbiotically across the country. The city would not exist without the country, and the country would not exist without the city (McHarg 1971). That is why Cochrane served as a precedent for many communities and a testing ground for this thesis.

As many feelings of belonging are lost in modern rural communities, it is essential to form a sense of belonging so that rurality stays alive. This thesis aims to surface passion for food, the environment, and our relationships with them. Resiliency will always be present in rural townships, but

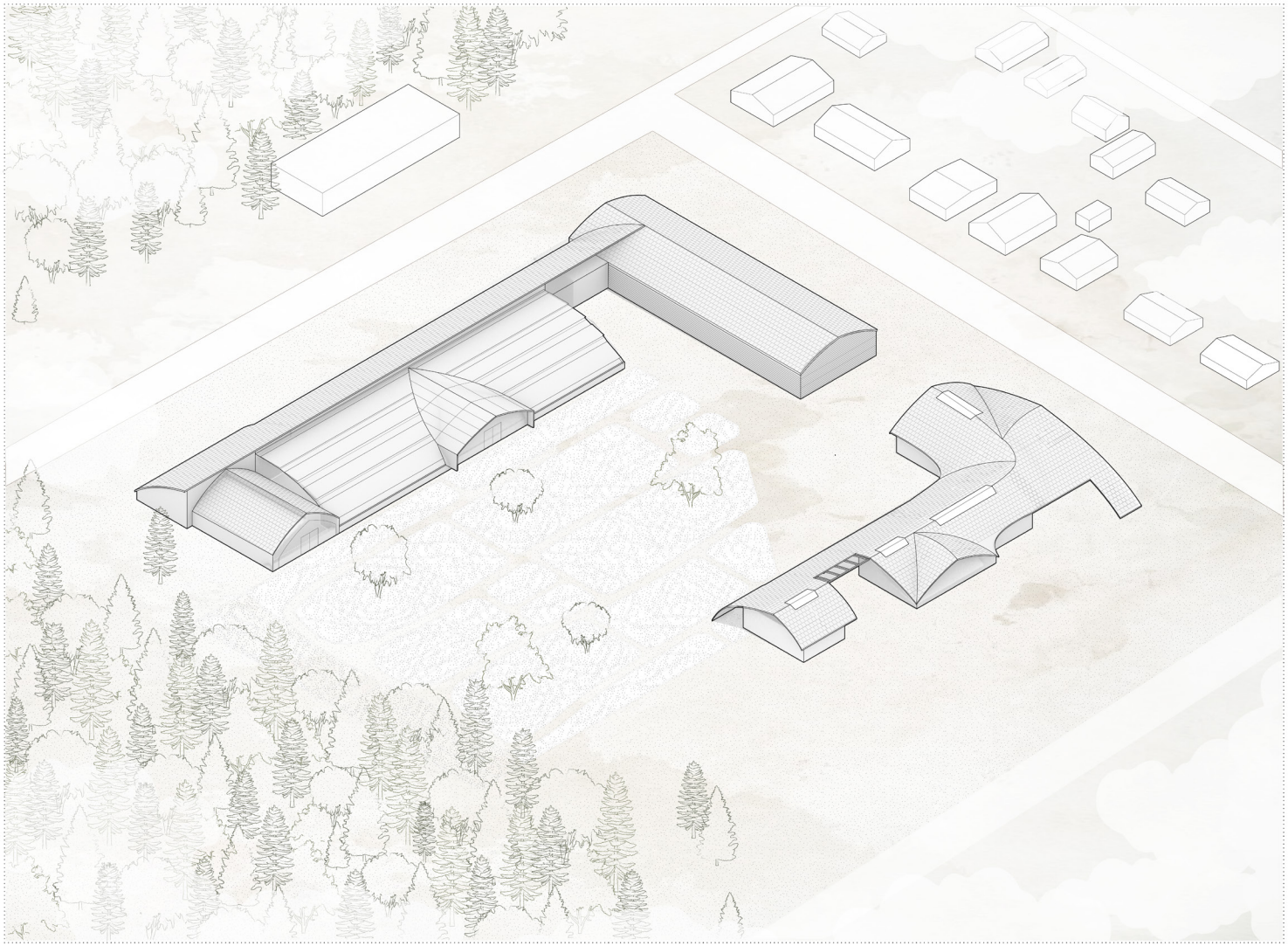
Model images of roof structure. Photograph.

sometimes it needs to be reignited (Dupre and Bischeri 2020). As the homes for indigenous peoples and migrants alike, a joint food knowledge of these spaces is intrinsic to survival. Through sharing and storytelling, accessible food sources are nurtured.

In reflection on these issues, I discovered that a solution was within reach through architectural intervention through the building systems application. The hope is that this can produce food, making it more attainable to people with all levels of agricultural knowledge. The closed-loop cyclical toolkit proposed creates a digestible method to join these food systems. Intersecting these systems with agricultural systems like regenerative farming and forest farming is the solution to issues related to food insecurity.

The foodscapes presented in this thesis are valuable to almost any community worldwide, especially Canada. As a highly forested region, natural food resources are plentiful in many communities and cities. Rural communities can apply the cyclical toolkit and foodscapes to their local context with minor adjustments. With changes to the architecture to meet climatic requirements, this thesis forms grounds for a large-scale solution to our disconnection from the land. In summary, Cochrane serves as a framework. Still, the process and methodology of this thesis can be applied to other rural and northern communities, planting seeds for thought across the landscapes.

In conclusion, this thesis promotes a learning space through intrinsic knowledge and allows local rural inhabitants to produce their food by applying knowledge to the architecture. Giving each community the tools to grow, preserve, store, and waste the products they’ve created promotes independence



Axonometric of main site, agro-food hub.

in today's consumerist food systems. These themes reignite the current feelings of rural resiliency embedded in these communities. By focusing on traditional ecological knowledge through multiple foodscapes, residents can create higher food yields and secure connections for future generations.

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