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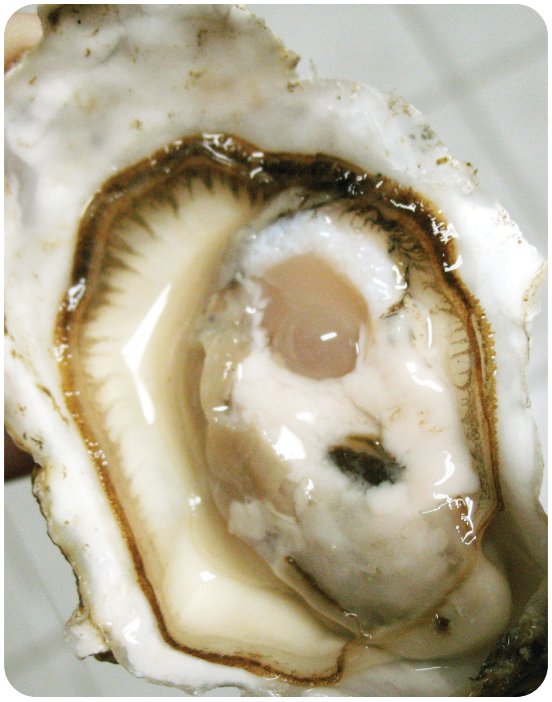

A common thread weaves throughout the articles in this issue: one of transformative change—either already in progress or still needed—among individuals, communities, and food systems. The theme extends to an experimental book-review format introduced by associate editor Phil Mount, in response to the dilemma of reviewing edited volumes that are by nature heterogeneous in content. The solution: a composite in which every chapter is individually reviewed. This issue thus contains 15 chapter reviews for *Cities and Agriculture: Developing Resilient Urban Food Systems* (by Henk de Zeeuw & Pay Drechsel) and 17 mini-reviews for each of the chapters in *How Canadians Communicate VI: Food Promotion, Consumption, and Controversy* (by Charlene Elliott). Such lengthy reviews do require extra effort, but, as Mount points out, it can be a satisfying collective project resulting in greater depth of analysis—and certainly a greater sense, for the reader, of what an edited book offers.

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Editorial

Transformations revealed through food studies

Ellen Desjardins

This issue brings us food-related research and perspectives from across Canada, from Nunavut and the Northwest Territories to central Alberta, Kenora (Ontario), and Nova Scotia. A common thread weaves throughout this work: one of transformative change—either already in progress or still needed—among individuals, communities, and food systems.

Moquin and co-authors focus on community gardening and its power to bring about heightened social cohesiveness and ecological involvement. Scrutinizing this subject through a camera lens and the voices of gardeners in Northwestern Ontario, they learned that such transformation is possible but not to be taken for granted, for it requires extra attention and resources to overcome feelings of exclusion and challenges of access, especially among Indigenous people of the region.

Connelly and Beckie, in their study of two Alberta local food initiatives (LFIs), explore the sustainability and transformative potential of these programs. Longer term success, they found, is greater if LFIs stick with models that promote progressive social infrastructure than if they struggle to co-exist with the price-convenience-efficiency target of the corporate food world.

Roberts-Stahlbrand has chronicled for us an historic overview of the apple industry of Nova Scotia between the mid 19th century and the present. Transformation in the maritime apple business was influenced by numerous factors: the rise and fall of market demand; the influx of mono-cropping, pesticides, and fertilizers; mechanized production and processing capacity; land consolidation and crop insurance; and tariffs, subsidies, and other policies. Further change, she argues, needs to happen through attention to ecologically sustainable practices.

Hiebert and Power have shone a spotlight on the way major news media have perpetuated discriminatory and "othering" attitudes towards people in Nunavut, in terms of food insecurity and actions to alleviate it. The message here—important but not always obvious—is that transformation in public discourse is a prerequisite for change, including federal and territorial policies that improve food security in Nunavut.

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Conversely, the research of Wesche and co-authors with northern Indigenous people illustrates a respectful approach that centres on capacity and agency. Colonization transformed the food available to these communities, resulting in "nutrition transition" and food insecurity that, as these authors learned from local interviews, is worsening with various forms of environmental change. Transformation towards more sustainable local food systems, they argue, is best led by Indigenous peoples themselves, especially by supporting the resources, skills, and traditional knowledge that enable procurement of foods from the land.

Bancerz has explored the transformative influence of various types of corporate social responsibility that food companies have devised, including non-traditional corporate food interests such as animal welfare and food literacy. She suggests that such engagement can exert a positive effect on food policy, if genuinely integrated with social benefit, but also a negative effect, if it is a smokescreen for boosting profit.

For those interested in ways to minimize food waste throughout the food system, MacRae and co-authors offer a kaleidoscope of policy, program, and regulatory frameworks for doing so. True to the MacRae approach, long-term transformation in the handling of food waste would require the cumulative efforts of reduction, efficiency, substitution, and redesign initiatives. This review article is a goldmine of detailed information that can serve as the basis for action as well as further research.

Finally, reviewers of books are like hewers of wood: with a critical eye, they start with a tome and carve out a discernable shape for us. The reviews in this issue will whet your appetite for books on food-related issues of feminism, human rights, food sovereignty, communication studies, and urban agriculture.

An experimental review format has been introduced by associate editor Phil Mount, in response to the dilemma of reviewing edited books that are by nature heterogeneous in content. The solution: a composite book review in which every chapter is individually reviewed. The treat is yours: you will find, in this issue, 15 chapter reviews for the book by de Zeeuw and Drechsel (2016) and 17 mini-reviews for each of the chapters in the book by Elliot (2016). Such lengthy reviews do require extra effort, but, as Mount points out, it can be a satisfying collective project resulting in greater depth of analysis—and certainly a greater sense, for the reader, of what an edited book offers.

The editorial team welcomes collaboration with the new CAFS Journal Governance Committee, established in June 2016: Rebecca Schiff, Lenore Newman, Jennifer Brady, and Kristin Lowitt. We thank the University of Waterloo for providing our OJS online platform, plus essential library staff support.

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Perspective

Getting to the core of the matter: The rise and fall of the Nova Scotia apple industry, 1862-1980

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Abstract

This article will apply food regime theory to an examination of the rise and fall of the apple industry in Nova Scotia between 1862 and 1980. From the 1860s until World War II, apples were a booming cross-Atlantic export business that continued the colonial bonds to Britain. But after the war, Britain developed its own domestic apple industry, and Nova Scotia apples failed to capture a loyal and secure market based on taste or quality. This led to the decline of the industry by the 1980s. Since that time, a new local apple industry based on taste and craft processing has arisen in Nova Scotia. This article affirms the broad historical analysis of food regime theory, while suggesting an enhancement of its assessment of the role of ecology.

Keywords: Food regime theory; apple industry; Nova Scotia; value-added; ecology

Introduction

In this article I will apply food regime theory to an examination of the rise and fall of the apple industry in Nova Scotia between 1862 and 1980. Due to the apple's prominence in Nova Scotia,

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there have been a number of other studies on this topic (Conrad, 1980; Hatchard, 1980; Hutten, 1981). However, none use the framework of food regime theory, nor do they specifically highlight the relationship between humans and the place-based ecological context of Nova Scotia—a subject I will comment on briefly in relation to the need to enhance food regime theory.

Food regime theory, developed by Friedmann and McMichael (1989), is a framework to understand the deeper and broader economic and political events that underlie historical food periods. The theory examines changes in food systems as connected to structural turning points in the reorganization of capital, state power, and modes of food production. Food regime theory is a way to historicize food by linking "international relations of food production and consumption to forms of accumulation broadly distinguishing periods of capitalist transformation" (Friedmann & McMichael, 1989, p. 96). It illuminates how each transition reframes the politics, scope, and technologies of agricultural development (McMichael, 2009). Food regime theory can provide insight into the apple industry in Nova Scotia. Although a case study of the Nova Scotia apple industry affirms the analytical capability of food regime theory, I argue that it also indicates a need for a greater focus on the integration of ecological and environmental concerns.

The first food regime, occurring between the1870s–1930s, was characterized by colonial exports to Europe which provided cheap food for European industrial workers. Colonies, such as Nova Scotia, had low-cost land to produce inexpensive agricultural commodities, and Britain had the technology and the people to create affordable industrial products, as long as factory workers could survive on cheap food. In this period, mass produced products began replacing regional production.

The post-colonial second food regime, occurring between the 1950s–1970s, was characterised by the rise of durable foods and industrialized agriculture. There was an increase in transnational agro-food sectors, specialization, and intensification. Presently, there is a debate about whether we have emerged into a third food regime (Friedmann, 2009; McMichael, 2009). However, the current situation, starting in the 1980s, is characterized by deepened global exchange, consolidated supply chains, displaced farm and peasant populations to cities, and a heavy reliance on fossil fuels for food production. At the same time, this hyper-globalization and corporatization has produced contrary movements that call for re-localization and food sovereignty (Friedmann & McMichael, 1989; McMichael, 2009). This paper will focus on the Nova Scotia apple industry during the first and second food regimes.

Historical Context (1605–1770)

The first written reference to the apple in Nova Scotia was made in 1605 by French explorer Samuel de Champlain, in a comment about frozen apple cider one cold winter on the frontier (Hutten, 1981). In the following decades, the French Acadians learned to harness the ecological

conditions of the Bay of Fundy in the Minas Basin and Annapolis Valley regions to create fecund agricultural soils. The success of Acadian agriculture in Nova Scotia was part technological prowess and part product of the ecology. The tides of the Bay of Fundy bring eroded particles of rocks and sea cliff into the water, which then attractions of minerals important to plant growth such as magnesium and potassium. As the tide moves into the marsh regions in the bay, it brings these soil-enhancing minerals and nutrient-rich decaying matter onto the land (Bleakney, 2004; Butzer, 2002). The Acadians developed a way to build dykes to protect the land from salt water flooding while taking advantage of this nutrient-rich soil. This created the fertile soil that allowed the French farmers to sustain a successful agricultural community (Bleakney, 2004). In summary, "the Acadian people were as much a product of the Bay of Fundy and Minas Basin intertidal meadows as was their agrarian produce" (Bleakney, 2004, p. 169).

In the 17th and 18th centuries, agriculture played a large role in the struggles over land among the Mi'kmaq, French, and English. The apple was an important agricultural crop. Practically, the fruit provided alcohol in the form of cider on the harsh frontier (Gwyn, 2014). Symbolically, the French and English saw orchards and agriculture as a justification for the appropriation of Mi'kmaq territory, and a representation of their ability to domesticate the wildness of nature and turn it into geometric and productive land (Pollan, 2002). The apple served as an important tool and symbol for settlement in 16th and 17th century Nova Scotia (for more detail, see: Roberts-Stahlbrand, 2014).

The apple as a booming cross-Atlantic business (1862–1933)

The apple brought Nova Scotia onto the world stage in the 19th and early 20th century. This section will examine the rise and golden years of the apple industry in Nova Scotia from its recognition at the Crystal Palace Fruit Show of 1862 until the peak year of production in 1933. The first period of the apple industry shows how the Nova Scotia apple became an important agricultural export for the province. This period roughly aligns with the first food regime, spanning the 1870s to 1930s, and supports its conclusions, while also noting the added richness highlighted by a place-based analysis.

Prescott as father, Annapolis valley as womb

It would be hard to examine the success of the apple industry in Nova Scotia without discussing its father, Charles Ramage Prescott, who lived 1722–1859. He arrived in Nova Scotia in the late 18th century and established Acacia Grove, which would become a hub of horticultural activity. Prescott was a gentleman farmer who used his wealth and privilege to improve fruit cultivation in Nova Scotia (Hatchard, 1980; Hutten, 1981). Most famously, he brought the Gravenstein to

Nova Scotia, which became a popular variety for over a century, and is still sold today (Hatchard, 1980).

According to some apple devotees, there are only a few places in the world that are able to grow the Gravenstein, and only in Nova Scotia can the apples reach their peak quality (Hutten, 1981). The climate proved pivotal to the early popularity of the apple in the province. Nova Scotia, and specifically the Annapolis Valley, has prime apple-growing conditions that have likely given them an advantage in global trade. For apple trees to grow, their roots need to be kept relatively dry, they need access to sun, and they need cold winters to let the trees rest (Wynn, 1975). Historical and current climactic reports show that the Annapolis Valley had especially good climatic conditions that gave growers a competitive advantage in regards to input costs and apple quality (Growing Nova Scotia, 2014; Province of Nova Scotia, 2006). This is an example of how ecology can be a semi-autonomous factor in determining how food regimes play out on a local level.

The climatic advantage led to production rates that were quite astounding. In the 1930s, the peak years of apple production, it is estimated that Nova Scotia produced 40 percent of all the apples produced in Canada. Of these apples, 75 percent of Nova Scotian apples were produced in a 40km radius surrounding Kentville, a key city in the Annapolis Valley region (Conrad, 1980). For the inhabitants of Kings County, where Kentville is located, "it was a source of great pride" that they produced so many of the province's, and indeed the country's, apples (Conrad, 1989, p. 19). The apple was not just something that happened to grow in the Annapolis Valley. It became an important part of the inhabitants' identity and culture. To this day, "the apple is king" in the Annapolis Valley (Mason, 2010). The annual apple blossom festival, which began in 1933, is still held each year.

The birth of the apple industry

In 1862, an international Fruit Show was held in England's *Crystal Palace*, the building made famous by the Great Exhibition of 1851. Nova Scotia had a prominent location in the exhibition, which provided a way "to indicate to the world the very varied, and hitherto almost unknown capabilities of the Province" (Nova Scotia Department, 1862, p. 1). The apples were widely admired. This exhibition put Nova Scotia on the world stage, and positioned it as the premiere apple producer within the British Empire. British buyers immediately realized the benefits of buying fruit from Nova Scotia, which had good growing conditions and available space for agriculture, and Britain provided a large number of consumers. It was a perfect partnership, and "from then on, the Nova Scotia apple industry grew in direct relation to the British Market" (Hutten, 1981, p. 26).

The next year, in 1863, Nova Scotian fruit farmers came together to form the Nova Scotia Fruit Growers' Association (NSFGA). That same year, the first apple barrel was made in the province. Previously, apples had been stored and sold in leftover containers found around the

farm (Meister, 1921). A few years earlier in 1861, a port had opened at Annapolis Royal and interprovincial railways proliferated throughout the 1860s and 1870s (Conrad, 1980; Hutten, 1981; Knight, 1862). Within a few short years, the product, the container, the transportation, and the consumer all came together—and an industry was born.

The ability to transport apples more easily to the British market led to increased apple production. The earliest records available of mass apple export start in 1880, and provide an average annual production of apples over a four year period. Here, all production levels will be reported in terms of barrels for the sake of consistency; although they have been recorded in barrels and bushels throughout history. A conversion rate of one barrel to 3.23 bushels has been assumed, based on an 1899 law stipulating the size of apple barrels (Apple Capital Museum Society, n.d.). Between 1880 and 1884, the average annual apple production was 9,333 barrels, with 32 percent exported and 68 percent consumed fresh in Canada. By 1900-1904, 371,000 barrels were produced on average each year, and almost 80 percent of Nova Scotian apples were exported to England. The year 1920 marked the first time apples were processed by drying in fire-powered evaporator facilities. The numbers kept growing, and by 1924, 1,471,000 barrels of apples were produced in Nova Scotia (Longley, 1932).

Quality concerns

Prior to 1939, apples from the Annapolis Valley sold in England because of their price, not their quality (Conrad, 1980). Sturdy, late-keeping, medium quality cooking apples catered to the desire for cheap apples, and the need for apples that could withstand transport. Complaints about quality led to the 1901 Federal *Fruit Marks Act*, which enforced a grading system for apples (Hutten, 1981).

Quality concerns persisted and even challenged the industry in boom times. As Ralph Eaton, an influential apple grower, said in 1909, “notwithstanding all the laurels we have won...we are annually growing an enormous amount of poor and practically worthless fruit” (Eaton in Gwyn, 2014, p. 71). The *Natural Products Marketing Act* of 1934 was another failed attempt to regulate quality, and British buyers became increasingly frustrated with the unreliable quality of Nova Scotian apples (Conrad, 1980). An official government agricultural marketing board was established in 1935. With a premonition of what was to come, the government attempted to create a local market with the *Buy Home Products* campaign of the early 1930s. According to their own report, it did not prove very successful (NSDA, 1934). Nova Scotians wanted sweeter, good quality apples that were not being grown for Britain, and instead got the apples that were not good enough to ship (Gwyn, 2014, p. 84).

Introduction of synthetic inputs

The spread of apple monoculture throughout Nova Scotia in the late 19th and early 20th centuries led to increasing problems with pests. In the early 20th century, the government began to take a systematic interest in agriculture and the use of pesticides. Under the request of the NSFGA, an agricultural research station was established in Kentville in 1910 by the provincial government (Hutten, 1981). The Nova Scotia Department of Agriculture (NSDA) also produced pest bulletins and hired pest inspectors and entomologists.

One of these pests was the brown-tail moth, which originally came from Europe through cross-Atlantic trade, and had no natural predators in Nova Scotia. The brown-tail moth was such a problem, that in 1913 a special bulletin was put out with "the very best coloured illustrations" so that everyone would be familiar with it (Matheson, 1913, p. 5). The generalized audience for this bulletin shows not only the pervasiveness of the pest, but also the pervasiveness of the apple in Nova Scotia. It stated that, "Everyone should become familiar with the various stages in the life-history of these two insects [the bulletin also contained information about the gypsy moth] and should continually watch for their appearance in his neighbourhood**"** (Matheson, 1913, p. 5). It seems as if the apple was important enough to Nova Scotia that it was every citizen's responsibility to guard against the spread of destructive pests.

The apple maggot was another common apple pest that was first reported in 1913. It later became such a menace that the NSDA established a branch called the maggot control board. Although an agricultural bulletin from 1917 stated that one can control the apple maggot by destroying fallen fruit, experiments "indicate that a cheaper and easier method may be found in the use of arsenical sprays" (Britain, 1917, p. 4). The bulletin went on to suggest a spray cycle that included five sprays throughout the season. This is an early example of accepting pesticides as the only sensible way to remove pests, and of a lack of forethought about the environmental implications.

In the early 1900s, pesticides were made with a range of chemicals mixed with water. Farmers would then apply the spray through a hose powered by a hand pump (Hutten, 1981). However, by practical necessity, the increased use of chemicals was "paralleled by the introduction of machines with which to apply them" (Hutten, 1981, p.103). In 1904 there was a serious case of fungus called black spot, which affected the apple industry. The federal government brought in an experimental power sprayer that ran on gasoline. It was much more efficient than a hand pump, but remained too expensive for most farmers, and was too large to fit in older orchards where trees were planted close together (Hutten, 1981).

This was the beginning of fighting pests with chemicals, but it was not the beginning of the war against nature, which was part of settlement and the early stages of the first food regime. As a report of the Nova Scotia Exhibition of 1854 makes clear, there was a sense of pride in the transition of land from "unbroken wilderness" to productive agriculture (Executive Committee of the Nova Scotia Industrial Exhibition, 1854, p.13). Conquering nature was violent; nature was

something to be broken by hard labour. The report stated that the change towards a productive landscape was not from the "waving of a wand," but required "many a sturdy blow" from axe men "before the wilderness was made to blossom as the rose...Beautiful Farms and neat and comfortable Houses are now seen where formerly naught but the trackless wilderness" existed (Executive Committee of the Nova Scotia Industrial Exhibition, 1854, p. 14).

Pesticides were not the only new agricultural input of the 20th century. Commercial fertilizers also grew in prominence. In the past, fertilizer took the form of fish waste, manure, ash, and other nutrient-rich additives that farmers could gather from their farm, as well as growing nutrient-fixing cover crops such as clover (Hutten, 1981). However, by 1933 the NSDA report spent 28 pages discussing different fertilizers. The report still seemed somewhat suspicious of recommending commercial fertilizers that require large amounts of "cash outlay" when available waste products from the farm did the same job of providing nutrients to the soil (NSDA, 1934).

The 1930s were a turning point for commercial fertilizer, and the NSDA report comments on the changing norms. Although the 1934 report cautions about large amounts of money required for commercial fertilizer, the NSDA notes the incredible capability of commercial fertilizer to provide six times more plant food than homemade fertilizer (NSDA, 1934). This shows the shift from regarding soil nutrients as something a farmer could nurture through the proper recycling of waste materials, towards something that had to be bought.

The first two hundred years of apple growing in Nova Scotia were undertaken with minimal off-farm inputs. It was challenging to make farmers reliant on inputs and capital. Farmers own the farm land, or the means of production, and can create sustainable cycles where they produce all their inputs and upcycle many of their outputs. The use of pesticides and fertilizers is one of the marks of the "penetration of capital into agriculture" (Lewontin, 1998). It meant the farmer could no longer produce everything on the farm, and had to pay money to corporations. Although the use of these inputs was a personal choice, pesticides and fertilizers became increasingly prevalent because they allowed farmers to increase yields and reduce labour costs (Lewontin, 1998). This is what food regime theory describes as the *proletarianization* of the farmer and the extension of capitalist markets to agriculture, a realm that was formerly low in monetary transactions and based on subsistence and barter (Friedmann, 1982).

Depressions and peaks

The Great Depression of the 1930s did not harm Nova Scotian apple growers nor dissuade them from the export-oriented first food regime. In fact, it further deepened this logic. The 1932 British Imperial Economic Conference, held in Ottawa, aimed to stimulate the economy among countries of the Empire during the Depression by improving trade and developing "something like an empire economic system" (Potter, 1932, p. 811). The conference resulted in a bilateral treaty that allowed countries to export raw materials into the British market without tariffs if they

gave preference to British manufactured goods in their local markets. This is commonly known as the *British Preference Tariff* (Rooth, 2010). Here economic dependence on colonial relationships can be seen explicitly in policy, right at the peak of the first food regime (and yet also right before its demise).

As the first food regime peaked, so did the apple. In 1933, Nova Scotia produced 2,862,658 barrels of apples. Of the apples produced, 280, 874 barrels were used in evaporator plants to make dried apples, 15,370 were canned, and 127,994 were made into cider (NSDA, 1934). Despite recent downturns with international trade and the creation and rise of a competitive British apple market, Nova Scotia apples were still almost entirely an export crop with 2,267,592 barrels exported, or 79 percent of total production. Even with the growing British domestic apple industry, Britain was still by far the largest importer of Nova Scotia apples, taking 1,886,347 barrels of the export crop (NSDA, 1934). During this period of 1862 to 1933, apples put Nova Scotia on the world stage. The apple industry became increasingly export-oriented and input-intensive. The apple industry also gave Nova Scotia a place in the world market, and gave the citizens a sense of pride and identity rooted in apple production.

A Rotten Apple: The Decline of an Industry (1939–1980)

The second food regime, from the 1950s to the 1980s, aligns with the second phase of the Nova Scotia apple industry, which is characterized by the protectionist, intra-national re-organization of food production that led to more localized manufacturing, the rise of the durable food complex, and a focus on intensification and high production agriculture (Friedmann & McMichael, 1989). Food regime theory helps illuminate how this movement in the early years of the second regime led to the rise of corporate-controlled food chains, and the increased importance of capital, necessitated by high-input agriculture (McMichael, 2009).

Apple production and sales remained high throughout the 1930s, with an average annual crop of about 1.7 million barrels over the decade (NSDA, 1939). However, Nova Scotians also started purposefully cultivating a local market for their agricultural products. The NSDA marketing board created the *Buy Home Products* campaign in the early 1930s to encourage the apple market at home. They also formed the league of loyal Nova Scotians, where a member pledged to give preference to Nova Scotia products (NSDA, 1934).

The war years

With the declaration of World War II (WWII) in 1939 came the NSDAs commitment to enlist the farmers of Nova Scotia "in a greater production effort" (NSDA, 1940, p. 10). In order to increase production for the war effort, the provincial government instated many new policies and subsidies. For example, a "substantial government cash subvention" kept limestone, a soil

additive, at $1.50 per ton; fertilizer companies agreed not to increase their prices by more than $1 per ton; mechanized tractors and plows were rented to farmers who did not have the capital to purchase the machines, cutting down on labour costs and increasing yield (NSDA, 1940). The war-inspired policies to increase production continued, and the latter half of the 20th century became fixated on yield. In the apple industry this meant that between 1931 and 1961, yield per apple tree went from 1.8 to 5.2 bushels (Hatchard, 1980). This is an outcome of the intensification efforts of the second food regime, partly facilitated by state-subsidized inputs to improve productivity.

WWII, however, was not a positive influence for the Nova Scotia apple industry. As noted by the NSDA marketing branch, "a vital blow was struck at the apple industry of the province when the war was declared last September, and a severe curtailment of shipments overseas resulted" (NSDA, 1940, p. 107). Since a majority of Nova Scotia apple sales went to England, trade restrictions from the war severely limited the market. To address this problem, the federal government negotiated a trade agreement to sell 1.5 million barrels of apples to Nova Scotia processing plants for 65 percent of their average price.

This trade agreement marked a huge jump in processed apples and contributed to the rise of "durable food" products, a key characteristic of the second food regime. "Durable food" is food that is canned, frozen, or processed to extend its shelf life. As the second food regime identified, the move to increase the processing of agricultural products was connected to the integration of agriculture into agro-food and corporate distribution chains. Corporations became more important for both food production and distribution. With a longer shelf life, foods that were once perishable and had to be consumed locally could be manufactured and marketed elsewhere. This shift towards durable products took off globally in the 1950s, reflecting a "larger trend to mass consumption and mass production of standardized products" (Friedmann & McMichael, 1989, p. 108). Not only did the durable food complex allow perishable foods to be sent around the world with more freedom, it also meant that oligopolistic corporate manufacturers became the main purchasers of raw materials as well as the main marketers of products (Friedmann & McMichael, 1989).

This trend can be seen in the case study of the apple. As the second food regime progressed apples were no longer sold from farmer to consumer, but from farmer to corporation to consumer. In 1938, 240,000 cases of canned apples were produced, and this jumped astoundingly with the war so that 1 million cases were produced in 1939 (NSDA, 1940). The processing plants also began making apple juice, which quickly became popular with the Nova Scotia public. The increased manufacturing of fresh apples decreased the power of farmers, and also opened the door to the power of retailers who stored seasonally grown and processed food all year long. At this point the patterns of power in the supply-chain began to shift in tandem with the new food regime (Winson, 1988).

Despite attempts to shift to processing, 1939 marked the beginning of the end for the apple industry in Nova Scotia. Although WWII trade restrictions may have "dropped the guillotine on the Nova Scotia apple industry," it was arguably doomed to fail before the war even

started (Hutten, 1981, p. 45). 1939 marked the year that the British apple market became self-sufficient. There was an immediate and steep decline in demand for apples from Nova Scotia. Apples were still being produced in the province, but no one wanted to buy them. This illustrates the vulnerability of a colony relying on the Empire to buy its undifferentiated product, rather than developing high-quality specialty products and localized food systems.

The transfer of technologies of war

1945, as noted in the first sentence of the NSDA report "will be most vividly remembered as the year when the war ended" (NSDA, 1946, p. 6). WWII ended officially in September 1945. But, according to Ron Kroese, "World War Two did not so much end…as turn its guns and bombs on the land" (Kroese in Roberts, 2013, p. 35). Wayne Roberts calls the post-WWII food system a *modernist* one—that is, it revels in technology's ability to free humans from nature's rules (Roberts, 2013). The poisonous gases and chemical advances of WWII were applied in the agricultural battle against pests and weeds. The mechanical advances of WWII, combined with a modernist desire to free humans from "scarcity, ignorance and drudgery" spurred on the burgeoning pre-war move to mechanization (Roberts, 2013, p. 36). This shift towards higher levels of mechanization, pesticides, herbicides, and synthetic fertilizers also meant that agriculture became more reliant on energy inputs. This need for energy was provided for by the post-WWII abundance and affordability of fossil fuels (Roberts, 2013).

In the 17th and 18th century in Nova Scotia, the apple orchard acted as proof that humans could domesticate and control the wilderness. Technologies introduced after WWII continued this dream and the human ability to execute it. The move towards high-input, highly mechanized, high-yield warfare agriculture became entrenched after WWII. Spray circles, organizations in each county that gave advice to farmers about spraying, became more active with the end of WWII (NSDA, 1946). In the 1949 NSDA report, there is the first mention of *weedicides* or chemical weed killers, which we now refer to as herbicides. They were found to be effective, but still too expensive for regular use. Synthetic fertilizer is casually mentioned throughout the report, suggesting that by the second food regime it had been completely incorporated into mainstream farming.

These new production techniques had two visible effects on the ecology of Nova Scotia. First, in 1945, it was noticed that "the mortality among bees as the result of the use of arsenical sprays was very high" (NSDA, 1946, p. 130). However, instead of decreasing the use of pesticides, it was thought that the only way to prevent bee loss was "to move the bees to a location where spraying is not being carried on, and then bring them back after the danger of poisoning is over" (NSDA, 1946, p.130). It seems in the agricultural war too, collateral damage was considered an unfortunate necessity. Second, the NSDA noted that after farmers removed the trees and ground cover to create farm land, there was a risk of soil erosion, which was considered an "immense loss" (NSDA, 1940, p. 148). The problem persisted and became "more

extensive" especially the erosion of the "all-important top-soil" that provides nutrients for plant growth (NSDA, 1950, p. 78).

Bottom of the barrel

After years of turbulence, including war-related trade restrictions and a declining British Empire, 1949 still showed "no improvement in the apple market" (NSDA, 1950, p. 139). The agricultural conditions for the year were satisfactory and 1,262,881 barrels of apples were produced, but consumers were limited and international competition was fierce. The 1949 NSDA report finally recognized that the closing of the British market would necessarily usher in long-lasting changes (NSDA, 1950). In 1951 the apple marketing board was disbanded because of its apparent incompetence, and inability to advocate for apple farmers or develop a strong market (Conrad, 1980).

The 1950s marked the formal beginning of the second food regime and the depth of the descent for the Nova Scotia apple industry. The steep decline of the early 1950s stabilized in 1957. By this time, only about half of the apples trees from 1939 were still in existence (Conrad, 1980). For a graphic look at the alarming decline in apple production, please see Figure 1. This graph represents apple production every 10 years from 1929 to1979 (NSDA reports). Note that 1933 is the year with the highest yield of apples in Nova Scotian history.

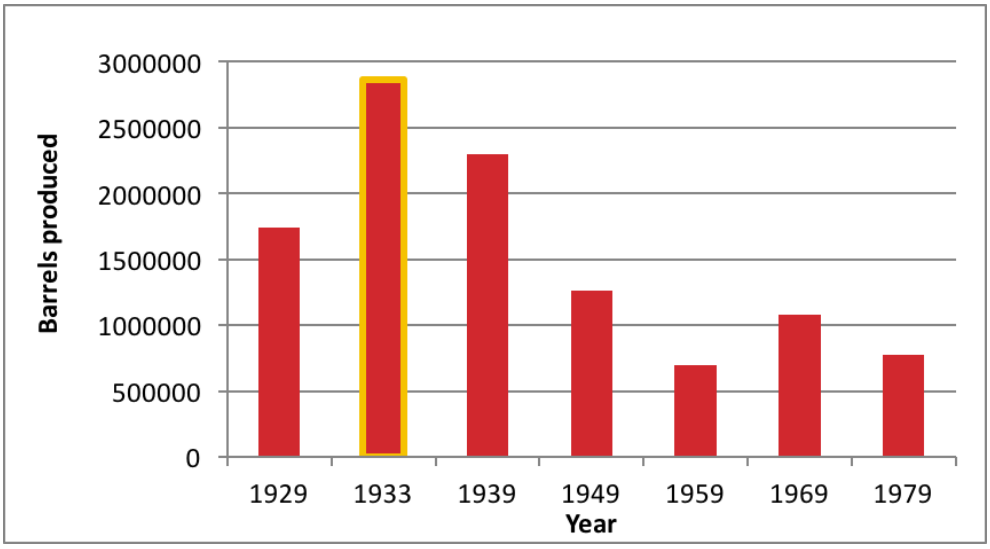

Figure 1: Decline in Nova Scotia apple production (NSDA reports).

Changing markets, changing production

The NSDA report from 1960 is markedly shorter than the previous volumes, and is also the first that does not start with a meteorological report. Although this may seem like a small change, it arguably represents a major shift that took place in agriculture. Agriculture was no longer about a human relationship with the earth; It was more about mining the soil for commodities. The tone is also different. This report has a business-oriented rhetoric, rather than the explanatory narrative of past reports. For the first time, there is an explicit emphasis in the report on production and yield. Rational decisions are defined within the paradigm of high production, not quality or sustainability of the product. Farming becomes something done by experts—scientists figure out soil requirements and spraying regimes, while business people market the product.

As food regime theory anticipates, the second food regime was marked by the increased dominance of capital and capital accumulation (Friedmann & McMichael, 1989). The use of synthetic additions in agriculture was entrenched. For the first time, there was a section on the current value of farm capital in Nova Scotia (NSDA, 1960). The NSDA actively encouraged increases in farm size. During the 1960s, Nova Scotia became part of a federal farm consolidation project. With this project, there was a trend "toward fewer and larger farms" (NSDA, 1970, p. 28). In the quest for efficiency, there was a move towards bigger, monoculture apple orchards. This consolidation was consistent with the second food regime's focus on intensification.

Crop insurance for farmers to cover spring-seeded grains, fall-seeded grains, and tree fruits was offered for the first time in 1969 (NSDA, 1970). Farms were so large that crop failure would not only mean the loss of an annual income for one family, but for all the people who worked on the farm. Nova Scotian farmers produced 1,083,591 barrels of apples in 1969. This was a relatively large increase from the depths of 1959, but still only 50 percent of average annual production in the 1920s and 1930s.

In 1979, 774,615 barrels of apples were produced. Of these, 6.4 percent were exported, 55.5 percent were processed, and 38.3 percent were sold fresh within Canada (NSDA, 1980). These numbers represent a marked change in apple distribution. As the large export market in Europe disappeared, Nova Scotia had to reorient its apples to the local and processing markets. The processing market responded much more quickly to the loss of the export market, but the local market for fresh consumption was eventually cultivated as well.

Figure 2 outlines the changing market. The first graph from 1933 shows the apple's dispersion at peak production when most exports were still being shipped to England. The graph from 1939 shows the sudden reliance on processing necessitated by WWII. The graph from 1979 shows the growth of the local market and continued reliance on processing.

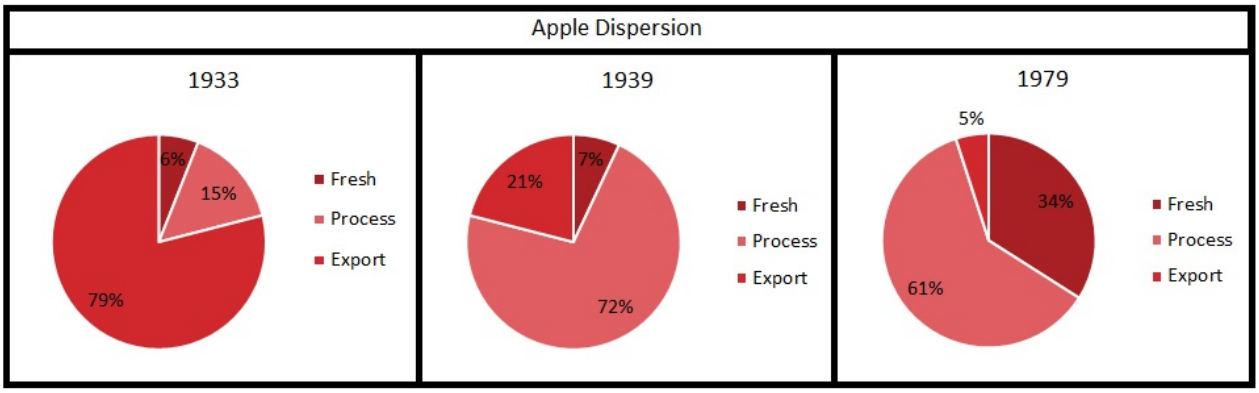

Figure 2: Apple dispersion in three key years: the peak year of production, the first year of WWII, and at the end of period of time studied in this article (NSDA reports).

Core changes

By 1980, where this study ends, fruit products as a whole made up only 7 percent of Nova Scotia's agricultural cash income, while animal products accounted for 75 percent of farm income (NSDA, 1980). The rise of animal production is consistent with an observation of the second food regime (Friedmann & McMichael, 1989).

Since the peak of the apple industry in Nova Scotia, many apple orchards were torn up; apple varieties were streamlined to meet consumer desires; pesticides, synthetic fertilizers, and herbicides were used extensively; machines largely replaced human labour; farm sizes grew; high yield agriculture was emphasized; and agriculture began to have a serious impact on the environment. Increased mechanization in both growing and processing of apples required larger up front capital investment. The move towards larger and more productive farms shows the emphasis on intensification, profit, and capital accumulation. The decline of the apple industry in Nova Scotia coincided with the end of the first food regime and the rise of the second food regime.

Conclusion

This paper has traced the Nova Scotia apple industry from 1862 to 1980 and identified how this case study and the analytical tools of food regime theory support and reinforce each other. There are two main conclusions that can be drawn from the apple case study when examined through the lens of food regime theory.

First, the Nova Scotia apple industry relied too heavily on one distant market. Because 75–80 percent of its sales were to England, the closure of this market gutted the industry, leading it to suffer from putting all its apples in one basket, so to speak.

Second, a problem that plagued the industry from its inception was that of quality control and a lack of differentiation. Nova Scotia grew mostly medium quality, low-priced cooking apples because that is what the British preferred in the late 19th and early 20th centuries. As competition grew and the second food regime took hold, Nova Scotia had no way to differentiate itself in the global apple market. Nova Scotia failed to take advantage of its prime environmental growing conditions to produce a differentiated or value-added product. Overall, this case study of the apple industry in Nova Scotia reveals the weakness of export-led growth, a dominant theme in both food regimes.

I have argued that there is a good fit between food regime theory and the case of the Nova Scotia apple industry. Food regime theory provides a reliable framework for this case study. However, the specifics of the Nova Scotia apple industry suggest the need to revise and amplify food regime theory to give ecological considerations more weight. Friedmann, too, has recently acknowledged the need to include social movements for ecology, and green consumers as important forces in the current global food context (Friedmann, 2015). Beyond social movements, the case of the Nova Scotia apple highlights the role of ecology as a semi-autonomous factor in global food systems.

The apple industry's very location and early success was predicated on quality soil from the Bay of Fundy and the fact that Nova Scotia's climate allowed apples to reach peak quality. This is a distinctive, place-based reality. Today we know that the food system is a major contributor to global carbon emissions, water pollution, and water use (Sage, 2012; Horrigan, Robert & Walker, 2002; Kirschenmann, 2009). By opening food regime theory to accommodate ecology, we are able to see how shifting food regimes entrenched environmentally-degrading agricultural practices, and set the stage for contemporary ecological problems in our food system.

This is not the first critique that food regime theory erases distinctive biological realities, as Friedmann herself explains it. She responds by saying that food regime theory does not include place-specific details, but instead represents "naturalized common sense in urgent need of deconstruction" (Friedmann, 2009, p. 342). Food regime theory is a powerful analytic tool that brings important insight into complex and seemingly disconnected global interactions. The case of the Nova Scotia apple industry forces us to hold two truths together about regime theory: it is effective and illuminating, but the lack of place-based analysis misses a powerful force in historical development (especially of agriculture). Food regime theory does not need to explain everything. But in an era of climate crises, it may be more important than ever to be aware of place-based realities, and to study the past and inform problems with ecological realities in mind. The case study of the apple in Nova Scotia highlights the need for food regime theory to be flexible and accommodate both ecology, and the human attitude towards nature/social movements as two semi-autonomous, powerful forces.

One bad apple don't spoil the whole bunch, girl

Despite the fact that the industry declined steeply after WWII, it has not completely disappeared. In fact, the tale of the apple industry from 1980 onwards embeds two contradictory themes. The first is a notion of gloom as everyone realizes the apple industry might never again be economically viable. The second is a story of hope, as farmers moved to differentiated and value-added products. In this way, the Nova Scotia apple industry follows the current food climate's dual story of entrenched global and corporate food trade, as well as a reclamation of localized food systems and food sovereignty.

Throughout the 1980s and 1990s, government support kept the apple industry alive. By 1992, federal and provincial government support payments accounted for more than 16 percent of apple farm revenue (Gwyn, 2014). Between 1980 and 1990, the 11 biggest apple growers had an average revenue of $116,100, but they still had a net loss of $0.65 per bushel. Subsidies were paying the way and it was thought that if the big, high-input, high-yield farms could not make money, then small scale farms certainly would not be able to break even (Gwynn, 2014).

In the 1980s and 1990s both apple growers and processors suffered and consolidated. Farms had already gotten bigger. The 23 processing plants of 1920 were replaced by a *virtual monopsony* in the processing sector (Winson, 1988, p. 537). The lack of competition among manufacturers eliminated the opportunities for apple growers and drove the price down. Strong government marketing boards in places like Ontario gave farmers more economic power and helped negotiate good contracts, but the marketing board in Nova Scotia was notoriously incompetent (Hutten, 1981; Winson, 1988). The rise of retailers, and their generic label products, took much of the power away from manufactures. Manufacturers tried to respond by increasing advertising and their brand power. With the power of retailers in the 1980s onwards, it seems there was "only room in the market for very small firms with special market niches, or very big firms" (Winson, 1988, p. 540). This suggests a tiny glimmer of hope.

Indeed, the 1990s also brought new life to the Nova Scotia apple industry. Some of the government support was forward-thinking. It funded orchard rehabilitation where farmers tore out undesirable apple tree varieties and replaced them with higher value varieties (Gwyn, 2014). One of the highest value apples is the *honeycrisp*, introduced to Nova Scotia in 1991. Nova Scotia has an ideal climate to produce this sweet and crisp apple (Erith in Mason, 2010). With renewed hope came a need for apple products to differentiate themselves and create a niche in the competitive market (O'Rourke, 1994). Nova Scotia has been developing niche markets through a combination of re-igniting local economies, stimulating entrepreneurship, employing ecological practices, and growing for quality.

In 2007, the theme of the NSFGA annual convention was to focus on local consumers, a far cry from the export-oriented markets of old. As well, in the early 2000s, The Nova Scotian government began encouraging organic apple growing because organic apples fetch a higher

price. The local and organic movements are not merely movements of market expansion; they are also moves towards a more sustainable food system.

Although durable food processing of the second food regime did not bode well for the apple, specialized processing spells hope for the industry. In 1993 Hanspeter Stutz opened up a winery in Grand Pré making fine apple dessert wine. Cider production followed in 2001. In the current globalized market, as Stutz says "it's not enough just to make, say, ten million litres of juice…we can do much more with apples" (Stutz in Mason, 2010).

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Original Research Article

Land-based programs in the Northwest Territories: Building Indigenous food security and well-being from the ground up

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Abstract

Food security in Canada's North is complex, and there is no singular solution. We argue that land-based wild food programs are useful and effective in contributing to long-term food security, health, and well-being for Indigenous communities in the context of changing environmental conditions. Such bottom-up programs support cultural continuity and the persistence of skills and knowledge that, over time, increase local food security and food sovereignty. This paper (a) highlights the link between observed environmental changes and wild food procurement in two Indigenous communities in the Northwest Territories, (b) compares and discusses the impacts of two collaboratively developed, community-based programs to improve foodways transmission and capacity for wild food procurement, and (c) identifies lessons learned and productive ways forward for those leading similar efforts in other Indigenous communities.

Keywords: environmental change, wild food, community-based research, community food security, Indigenous health and well-being, northern Canada

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Introduction

Environmental changes are being documented on a global scale, with northern regions experiencing some of the most significant and rapid shifts. Global trends include increasing atmospheric and ocean temperatures, shifting vegetation zones, thawing permafrost, declining sea ice, and rising sea levels (ACIA, 2005); however, the nature of these changes and their impacts varies regionally. Indigenous peoples[1] are particularly vulnerable, as they rely on the integrity and continuity of local ecosystems for wild food[2] and to maintain vital social and cultural practices. In northern Canada, cumulative exposures to social and environmental stressors are challenging the capacity of remote communities to attain food security. Since European contact, and particularly over the last half-century, colonial processes have disrupted historically-embedded social and cultural norms and dispossessed Indigenous groups of their traditional lands and resources (Reading & Wien, 2009).

The resulting nutrition transition has led to a shift from former reliance on nutrient-rich wild food harvested from the land towards greater consumption of market food purchased from the store, which is often highly processed and of lower nutritional quality. This has serious implications for health and well-being (Kuhnlein, Receveur, Soueida, & Egeland, 2004; Loring & Gerlach, 2009). The nature of the mixed diet presents unique challenges for addressing food security. Accordingly, northern food security, while not a new issue, is increasingly being recognized as a multi-faceted issue that requires urgent attention (Council of Canadian Academies, 2014).

In remote northern communities, market foods provide some level of food security; however, their quality and availability relies on the continuity of costly transportation systems that are vulnerable to global economic influences, they are expensive for individuals to purchase, and they do not replace the foundational socio-cultural roles played by local wild foods (Gerlach & Loring, 2013). At the same time, the procurement of wild foods, which historically provided the basis for survival in these regions, is challenged by a combination of increasing costs for harvesting, inflexible regulatory frameworks, environmental change, and disruption of inter-generational knowledge transmission processes. This has led to lower wild food use among younger generations (Kuhnlein & Receveur, 2007; Receveur, Boulay, & Kuhnlein, 1997). As food insecurity reaches critical levels in northern Canada and becomes more of a focus of research and discussion, northerners continue to recognize the value of wild foods for diet and health, as well as for socio-cultural well-being. They are also advocating for mechanisms that help to revitalize their food cultures by reviving and strengthening wild food practices (Fillion,

[1] We use the term "Indigenous" to refer collectively to First Nations, Métis, and Inuit peoples in the Canadian context. However, when referring to a specific Indigenous group, we use their own self-appellation (e.g., Dene or Métis peoples) to avoid representing these distinct cultures as a homogeneous group.
[2] In this paper, "wild food" is synonymous with "traditional food" and "country food", and includes both plants and animals harvested from the northern environment for consumption (e.g., moose, geese, fish, and berries).

Laird, Douglas, Van Pelt, Archie, & Chan, 2014; Loring & Gerlach, 2009; Organ, Castleden, Furgal, Sheldon, & Hart, 2014; Skinner, Hanning, Desjardins, & Tsuji, 2013).

Food security in Canada's North is complex, and there is no single solution. We argue that land-based[3] wild food programs are useful and effective in contributing to long-term food security for Indigenous communities in the context of changing environmental conditions. Our objectives are to (a) highlight the links between observed environmental changes and wild food procurement in two Indigenous communities in the southern Northwest Territories, (b) compare and discuss the implications of two collaboratively developed, community-based programs to improve capacity for wild food procurement, and (c) identify lessons learned and productive ways forward for communities. The two research sites, Fort Resolution and Fort Providence, are small Dene-Métis communities located in the southern Northwest Territories in the central Mackenzie River Basin, in what is known as *Denendeh* (the land of the people). In both cases, a combination of climate change and commercial resource development, among other stressors, is impacting the surrounding traditional territory and affecting the ability of community members to procure wild food.

We focus here on the impacts of environmental change on wild food procurement, but recognize that this is only one aspect of a more complex issue; thus, we place our analysis in the context of a range of other stressors. We first outline our methodology, followed by an overview of the changing environmental and socio-economic contexts of the region and links to food security. Next, we describe the land-based programs implemented in both communities as an adaptation response to re-empower local youth and contribute to healthier diets. We then present key lessons learned from this process, followed by insights on how these lessons might apply in other northern locales.

Methodology

The development and implementation of this research was guided by Indigenous methodologies (IM). This fostered a collaborative process where Indigenous perspectives and ways of knowing are central. Throughout the research process, we worked with band councils, Dene and Métis Elders, land-users, and community members to follow established protocols and collectively define the research objectives in a way that reflected community values and priorities. Using this partnership approach, we worked with our community partners throughout the research process (Kovach, 2010; Smith, 1999), beginning with defining important community issues and jointly shaping the research questions. IM and other participatory community-based methodologies offer a positive way to help make power relationships in research processes more equitable, while empowering Indigenous participants (Alfred, 2005; Bishop, 2005). Such processes also

[3] The "land" is a commonly-used term in the north that describes the surrounding environment in a holistic manner. Thus, "land-based" wild food programs include harvests from the land, water and air.

help to address community interests and ensure that sensitive material is handled appropriately (Battiste & Henderson, 2000).

The data used here derives from research projects related to a) environmental change and b) wild food procurement with both communities since 2004. In both cases, researcher-community relationships were initially built around participatory projects focused on documenting and understanding changing environmental conditions. Initial relationships were established with the First Nations Band Councils in the respective communities, through primary liaison with Environment/Natural Resources Managers. The partnerships expanded to include representatives from the hamlets, local Métis associations, and schools, among others. Perspectives on environmental change in the Fort Resolution area were documented in 2005-06 using a series of 33 semi-structured interviews with land-users and Elders that were facilitated and, where needed, translated by a local research assistant. This also involved on-the-land field visits and participant observation (Wesche, 2009; Wesche & Armitage, 2006; Wesche & Armitage, 2010).

Since 2012 we undertook similar activities to understand environmental change in the Fort Providence area, conducting three interactive community meetings and 12 semi-structured interviews with local land-users and Elders. In both cases, the initial research question examined how local people were experiencing and tracking environmental change, what the impacts were (with a key focus on local land-use), and what kind of adaptive response was in place. We also worked with natural science scholars and researchers to achieve a more holistic understanding of environmental change in both locations (Brock et al., 2010; Wolfe et al., 2007).

Through these existing researcher-community relationships, community-identified interests around wild food procurement emerged in both Fort Resolution and Fort Providence. This led to their inclusion in a subsequent multi-community project to implement community-generated food security interventions in the north and evaluate their impact on various factors that support food security and community well-being (e.g., knowledge sharing, cultural continuity, social networks, and food access). Data from these recent land-based initiatives derives from our experience in developing partnerships with communities, supporting program implementation, and participating in program activities since 2012. This includes quarterly meetings (telephone and face-to-face); semi-structured interviews (32) with school Principals and staff members, Elders, and land-users; multiple researcher visits to the communities; participation of research team members in coordinating land-based programs; and engagement in local wild food practices. In all cases, local research assistants were engaged to help plan and implement the research activities.

Ethics approval was granted by Wilfrid Laurier University for the 2005-06 research and by the University of Ottawa for the subsequent components. Northwest Territories research licenses were granted by the Aurora Research Institute. Consent forms were used, and only those individuals who agreed are referenced by name in publications. All personal and telephone interviews were transcribed verbatim, and notes from focus groups and other activities were also transcribed. The environmental change data was coded through an iterative process led by one

team member, and the programs data was analyzed thematically by two other team members who had collected the data. Preliminary results were presented to and verified by community members using both public forums and one-on-one discussions, and resulting draft publications were provided to community representatives for feedback prior to submission. Representative excerpts from the interview transcripts are presented below[4].

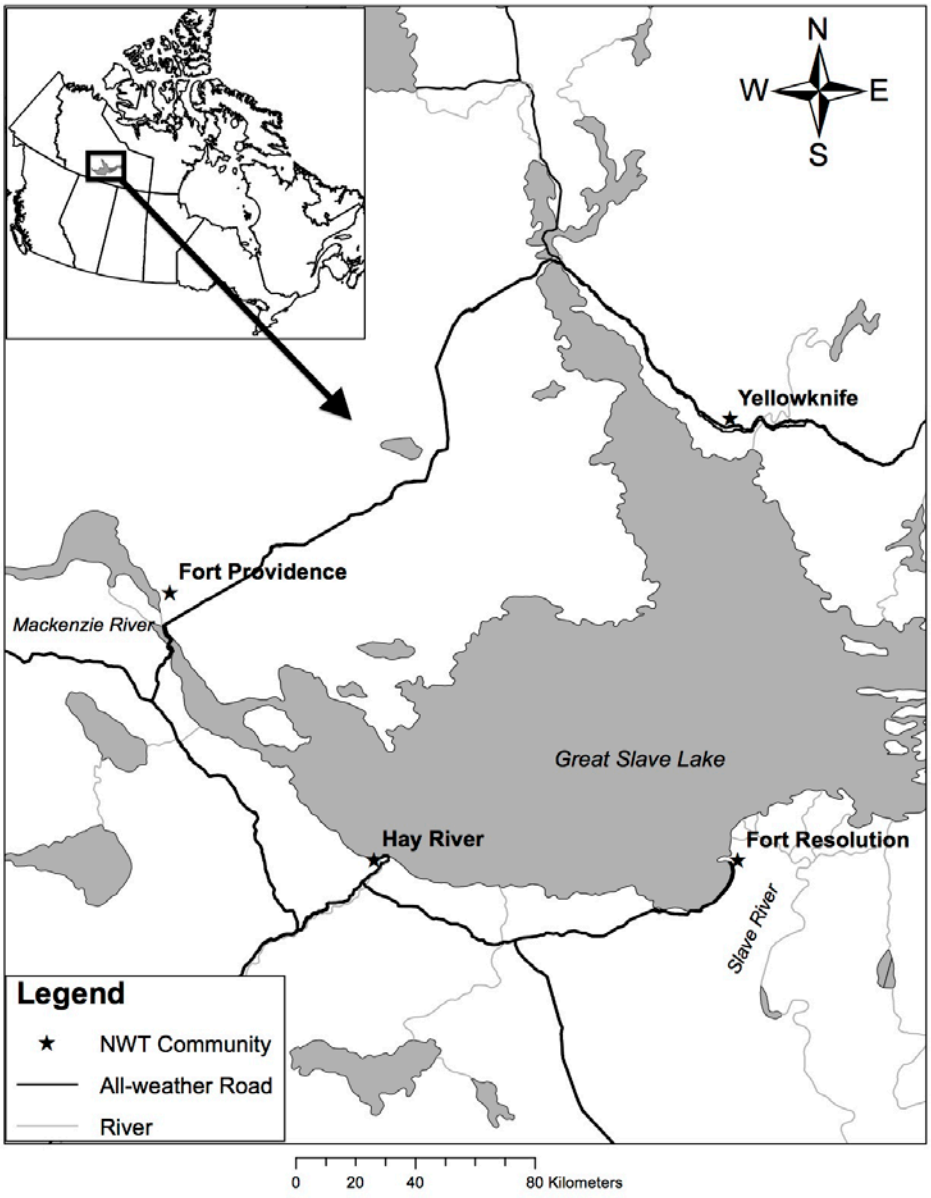

Figure 1: Location of the case study sites: Fort Resolution and Fort Providence, Northwest Territories, Canada

[4] All quotations from the 2005-06 research are found in Wesche, 2009.

Community Profiles: Fort Resolution (Deninu Kue) and Fort Providence (Zhahti Kue)

The communities of Fort Resolution and Fort Providence are both located in the southern Northwest Territories, Canada, above the Alberta border in the central Mackenzie River Basin (Figure 1). Both are small Dene-Métis communities, with Fort Resolution residents being of primarily Chipewyan Dene heritage and Fort Providence residents being primarily of Slavey Dene heritage.

The hamlet of Fort Resolution (61.17° N, 113.67° W) is located on the south shore of Great Slave Lake near the mouth of the Slave River. The community is home to a population of 480, 90 percent of which is Indigenous (Northwest Territories Bureau of Statistics, 2011c). Settlement in the area was linked to fur trade activity beginning as early as 1786. The settlement developed into a central node in the northern trading system due to its strategic location at the mouth of the Slave River (Smith, 1982). A mission and orphanage were established later (1858 and 1903, respectively), and the orphanage was converted to a residential school in 1909. A convent and hospital were added in 1939, offering centralized services for many people in the Great Slave Lake region (Fumoleau, 2004). The late 1960s saw the completion of a road connection to the community and new employment opportunities at the nearby Pine Point lead and zinc mine (open 1964-1988), both of which had major socio-economic impacts on Fort Resolution. At present, *Deninu Kue* First Nation is one of four Akaitcho Territory (Treaty 8) bands involved in treaty and self-government negotiations.

Fort Resolution residents continue to rely heavily on the resources found in and around the three main river systems in their traditional territory—Slave, Talston and Little Buffalo—as well as Great Slave Lake itself and the shallow ponds found in the Slave River Delta. Common wild foods include moose, bison, muskrats, beavers, rabbits, geese, ducks, ptarmigans, and several species of freshwater fish (e.g., lake whitefish, northern pike, walleye, burbot, longnose sucker, lake trout). Caribou are also hunted periodically, but require long-distance travel from the community.

The hamlet of Fort Providence (61.35° N, 117.66° W) is located on the east bank of the Mackenzie River, approximately 75 kilometers downriver from the outflow at Great Slave Lake. The community is home to a population of 778, 93 percent of which is Indigenous (Northwest Territories Bureau of Statistics, 2011b). The settlement was established with the building of an orphanage and mission in 1867, followed by a Hudson Bay fur trading post (Hamlet of Fort Providence). It has long acted as a hub for goods and people being transported up and down the Mackenzie River. Since 1968, the Mackenzie Highway has facilitated travel to nearby communities (including Yellowknife) and southern Canada, resulting in substantial and diverse impacts on the community. Recent advancements in governance frameworks have led the *Deh Gah Got'ie'* Dene Council to join with nine[5] other First Nations and Métis Councils to

[5] The Dehcho Process was initiated in 1999 with 13 members, three of which have since withdrawn.

participate in self-governance, land and resource negotiations with the Government of Canada (Treaties 8 and 11).

Fort Providence residents rely heavily on surrounding water resources for accessing harvesting areas. These include the Mackenzie River, Great Slave Lake, and the many small lakes and streams found in the low-lying Great Slave Lake Plain and the Horn Plateau area that make up their traditional territory. Fort Providence residents maintain many traditional cultural practices, and continue to rely in large part on wild foods, including moose, caribou, rabbits, geese, ducks, and several freshwater fish species (e.g., lake whitefish, northern pike, walleye, burbot, longnose sucker, lake trout). Bison have also been available in the area since 1963 when a protected herd was established in the newly formed Mackenzie Bison Sanctuary; however, only a limited number of local residents commonly eat them. Trapping fur-bearing mammals, such as marten, muskrat, and beaver is also an important economic and cultural activity.

Results: Food security and environmental change

While market foods now form a significant component of the diet, Indigenous northerners remain connected to the land, and multiple aspects of wild food procurement (e.g., nutritional, cultural, social, economic) are key to cultural continuity and well-being. Wild foods often play a key role in achieving food security, namely "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO, 1996, section 2, para 1). This concept is linked to other related concepts such as "nutrition security" (access to essential nutrients) and "food sovereignty" (decision-making power over food systems), both of which apply in the northern Indigenous context (Council of Canadian Academies, 2014). It is imperative to recognize that food security is not just about having food on the table, but also encompasses how people think about and approach food procurement and consumption. Thus, possessing appropriate and adequate knowledge combined with having collective control and sovereignty over food systems are both critical (Desmarais, 2015). Foodways transmission, namely the manner and mechanisms by which food-related knowledge is shared and learned within families and societies is a key component of this process (Ruelle & Kassam, 2013).

Food security relies on four key pillars, each of which is affected by multiple factors. These include: *availability* (amount and diversity of traditional food species on the land and/or market foods in the store), *accessibility* (amount of money available to purchase harvesting equipment or market foods; physical ability to reach harvesting areas or stores), *quality* (nutritional value, food safety and cultural acceptability), and *use* (knowledge and skills for food procurement) (Nunavut Food Security Coalition, 2014; Wesche & Chan, 2010). The *stability* of food resources over time is also a key parameter. A number of stressors, both historical and contemporary, are impacting northern food security. First we focus on the direct role of rapid

environmental change as a key contemporary northern stressor that exerts significant impacts on wild food systems. Thereafter, additional stressors are also addressed to provide a holistic perspective.

Regional environmental change

Environmental change has considerable impacts on all four pillars of food security. The availability, accessibility, and quality of wild food are all influenced directly by changing conditions. For example, caribou may change migration patterns making them less available in some areas; thin ice may make harvesting areas less accessible, and warming temperatures can enable previously unknown illnesses to establish in the area, affecting animal health and thus reducing meat quality. The *use* pillar is influenced indirectly by environmental change. For example, changing ice conditions may limit land-use at certain times, reducing opportunities for intergenerational knowledge transfer to youth. This limits the development of skills and knowledge for safe and effective wild food procurement.

These environmental change trends are being experienced in both Fort Resolution and Fort Providence, where Indigenous livelihoods are linked to climate, weather, and ecosystems. Although each locale has its unique context, both communities are located at similar latitudes on or near Great Slave Lake, and thus are broadly influenced by similar climatic and hydrological conditions as well as non-point source pollutants. The Mackenzie River Basin (MRB) is undergoing a general warming trend and seasonal shifts in precipitation and evapotranspiration, which will continue to impact hydrological parameters (Yip, Burn, Seglenieks Pietroniro, & Soulis, 2012). Accordingly, local residents have observed significant changes in climatic phenomena over the past half-century relating to temperature, precipitation, seasonality, and wind. Two Fort Resolution Elders, Denise McKay and Gabe Yelle, reported the following:

> To me, everything started changing from 1960 – even the weather, even the snow. The weather pattern has shifted dramatically.
>
> March used to be nice but windy, and then spring would begin in April when the weather started to warm. Recently, we have had some long cold springs, which did not used to happen.

Climate-driven impacts on the hydrological regime of the upper Mackenzie Basin affect water quantity, timing of flow, and water quality downstream (Brock et al., 2010). Local residents have observed changes such as: more variable river discharge, lower water levels, delayed and more variable ice freeze-up, thinner and more unstable ice, earlier and more variable ice break-up, and increased sediment in river and lake water. These changes can affect land-user access to harvesting areas (e.g., reduced boat access to fishing and hunting areas, safety concerns due to ice and weather conditions) as well as wildlife health (e.g., due to altered habitat conditions). Angus Beaulieu, long-time land user, local Fort Resolution historian, and Elder noted:

> The ice used to be thicker in the rivers and lake. I used to set a net behind Moose Deer Island in the 50s to 70s and the ice was over six feet deep. Now a fisherman's lucky if he finds two feet of ice.

Resource development in different parts of the MRB also influences local environmental conditions. Both upstream development, such as the Alberta Oil Sands and Peace River hydroelectric operations, as well as more localized activities like the historic Pine Point lead and zinc mine and highway development since the 1960s, including the recently constructed bridge over the Mackenzie River, combine with climate change to effect multiple impacts on wildlife and local harvesting activities. This is highlighted by Fort Providence Elder Denise Trudeau:

> There's less moose around, less of the big game around. Especially now with the highways, the transportation. The highways, in particular, go through some moose or buffalo sanctuaries. It drives them away.

Species *availability* may be compromised due to habitat changes that result in increased wildlife mortality or shifting migration routes. For example, Fort Resolution land-user Don Balsillie has noticed changes in the migratory patterns of geese, for which the nearby delta has long been a sanctuary:

> You don't see as much migratory birds coming through the delta. … But what I have noticed is the birds that do come through … they are coming a bit later because of the weather conditions. They are staying a little bit longer.

Similarly, Balsillie indicated that warmer water temperatures in Great Slave Lake cause fish to move and congregate in different areas:

> The last number of years that I've been out there fishing each year [the fish have] started to make some changes in their habits of travel – because of the temperature of water, because [of] the late spring. So, everything is evolving.

Increased incidence and severity of fires leads to periodic impacts on local wildlife. Two Fort Providence school staff members, Nancy Francis and Greg Wright, commented on the particularly prolific 2014 fire season:

> Last summer, the forest fires drove the animals away, too. The moose, the rabbits, whatever. They're hardly any left around where we hunt because of it. They might be starting to come back now,

> but those fires made it hard to go out hunting when they were burning and now because everything's [the animals] all gone now. ...and then the forest fires. That's another one that drives the game away. And in particular last summer we had lots of fire…and especially in and around our area, there. So there is less small game and less for the wolves and that to prey on. They are after the big game now.

Changing conditions also challenge travel safety and physical *access* to particular hunting and gathering areas. For example, Fort Providence land-users Theodore Matto and Rudolph Landry have observed a combination of increased water levels, delayed ice freeze-up, heavy snow, and warm temperatures, all of which limit travel by snowmobile:

> The weather has really changed. It doesn't really freeze over solid enough to trust a skidoo going in there. Even in the cut-lines, in some places, it isn't even frozen.
>
> Now the climate is getting warmer too. … And underneath the ice is just water, under the snow. Even all these lakes have overflowed. You have to watch [out].

At the same time, while certain species may be both *available* and *accessible*, changing conditions can impact the *quality* and safety of the meat. For example, residents of both communities have reported concerns about changing meat texture, increased presence of abnormalities such as tumours in fish, and the ongoing presence of diseases like anthrax in bison, whose outbreaks are influenced by environmental conditions. Fort Resolution Elder Denise McKay noted:

> The fish meat is different for me. … Sometimes the [flesh is] just soft, so that's different. A long time ago the meat was just nice.

The nature of the abovementioned observations reflects the importance of traditional knowledge in identifying and responding to environmental challenges. Such knowledge is rooted in a specific localized environment and is gained over many years of intimate, place-based interaction. The level of knowledge of an individual or group is directly linked to wild food *use*, as one must know when, where, and how to travel safely and to locate, harvest, and prepare wild foods. Local residents in both communities highlighted the need for such knowledge systems to be perpetuated and transferred to younger generations. Fort Resolution land-users Harvey Mandeville and Kenneth Delorme noted the following:

> Yeah, you pretty well have to be careful. You have to know your way around. A guy can't just take off like that if you don't know this country.

> Land use is changing. There's a few people trying to get back into using the land and stuff. [Some have] never been on the land before, maybe, but their parents had. Some of it is being lost. It could be taught to them, re-taught to them or saved.

Continued evolution and transmission of relevant knowledge and skills can mitigate these challenges by enabling new forms of access and increased ability to use a range of wild food products. With an in-depth base of traditional knowledge and experience, some land users are able to adapt their practices to ensure both safety and success on the land (e.g., delay hunting trips, change travel patterns, carry safety equipment). They may also adopt new ways (or re-learn old ways) of harvesting, preparing, and consuming under-utilized species or parts of currently harvested animals (e.g., bone marrow, organs) or more recently available species (e.g., those moving into the area as their ranges shift due to climate change).

Socio-Cultural and Economic Stressors

From a food security perspective, consistent access to healthy foods, especially culturally appropriate local foods, is a considerable challenge for both communities. The prevalence of market food use is high, in part due to its greater convenience, variety, and ease of preparation. The uncertain availability, accessibility, and quality of wild foods also encourage the consumption of market foods. While both communities have all-weather road access[6], each is located several hundred kilometers from the nearest urban area, thus living costs (e.g., food, equipment, fuel, electricity) remain high. Food prices are approximately 31 percent higher in Fort Providence and 41 percent higher in Fort Resolution than in Yellowknife (Northwest Territories Bureau of Statistics, 2011a). The availability and quality of fresh produce and meats is often limited, as food shipments generally come in once a week and stock is quickly depleted. Road access to the communities can also be unpredictable in winter due to weather. Community members with limited financial means tend to rely on staple goods purchased at community stores, rather than travelling to the larger centres of Yellowknife or Hay River for cost savings and increased selection. Thus, due to economic constraints, food availability, and changing food preferences, many residents often have no choice but to purchase cheaper foods with longer shelf lives, which tend to be higher in fat, sugar, and additives, while having lower nutritional value (Receveur et al., 1997; Pal, Haman, & Robidoux, 2013).

Changing environmental conditions induced by climate change and industrial (largely resource-driven) development place added pressures on communities that are already working to adapt to a range of other stressors. Socio-cultural transitions occurring in the context of modernization are further challenged by the knowledge gaps left by the colonial education system. All of these stressors impact food security in a range of ways. Over the past century,

[6] Until the Deh Cho Bridge opened in November 2012, spanning the Mackenzie (Deh Cho) River, Fort Providence experienced temporary interruptions in road access during ice freeze-up and break-up.

Indigenous people in Canada have experienced systematic assaults on their subsistence practices and ways of life. Education has moved from being largely "on the land" with family members to "in the classroom" with trained teachers. Land-based knowledge and practices have been curtailed by a separation from the land through the residential school system and the removal of cultural links to the land in school curricula (Miller, 1996; Milloy, 1999; Haig-Brown, 1988; Streit & Mason, in press). Combined with other socio-economic pressures linked to government intervention and modernization, this has disrupted on-the-land experiential education processes, which are key to effective traditional knowledge transfer from elders to youth. This knowledge transfer gap means that youth often lack the necessary knowledge and skills to harvest and prepare wild foods (Robidoux, Haman, & Sethna, 2009).

Sustained transmission of traditional knowledge and harvesting practices is essential for the continuity of wild food procurement processes. This is a challenge for many Indigenous communities, as parents may not possess the knowledge and skills to pass on to their youth. To enable younger generations to adapt and thrive under new and varied conditions, youth must be given opportunities to acquire basic land-based knowledge and skills through ongoing experiential learning (Pearce, Wright, Notaina, Kudlak, Smit, Ford, & Furgal, 2011). Local schools have the opportunity to play a key role in building the capacity of Indigenous youth to be able to access the "bank" of food on the land if and when they need to, thus building resilience into the food system. While recent and ongoing improvements in northern school curricula are aimed at better incorporating Indigenous content and perspectives, the level of experiential learning about food procurement skills guided by Elders and land-users varies significantly by school and region. One way to address such gaps is to develop and implement land-based programs to build skills and knowledge around wild food harvesting in the context of environmental change. Two such programs are profiled below.

Results: Land-based programs

As outlined above, wild food access and production challenges are incredibly complex in northern Indigenous communities. While the programs discussed below were not designed to solve pressing food security or sovereignty issues, they aim to serve as a foundational block to promote integration of local land-based food programs into formal education systems and contribute to wider community health objectives. As noted by community leadership, the nutrition habits of parents in both communities vary considerably among and between families; regardless, a sizeable number of children rely on the schools to provide basic meals. As food security has come to the forefront as an important local issue, community leaders have been

actively looking into ways to tackle this challenge. Their motivations to build supportive, skills-based programs provided the impetus for the involvement of external partners.[7]

Since 2012 we have been working directly with the Principals at each of the local schools to support the development of community-based initiatives to improve wild food procurement as a method to increase access to healthy and local foods, especially for youth. In line with our previous research work with rural northern Indigenous communities, both in Canadian territories and provinces, we adopted a bottom-up approach for both NWT communities. We conducted initial visits to understand the needs of community members, in particular regarding their desire to build land-based programs and integrate them into the local school system. After initial visits and meetings with local band council members, Elders, knowledgeable land users, and staff from the schools, we worked collectively with community members to design and implement programs in the schools. In both cases, staff time was dedicated to these projects and funds were used to recruit local harvesters and Elders to work with the students. The selected projects are consistent with the intervention ideas identified by other global Indigenous communities interested in improving health through better food knowledge and access (Kuhnlein et al., 2006; Sharma, Gittelsohn, Rosol, & Beck, 2010; Kolahdooz et al., 2014). Here we outline the evolution of each program to provide a basis for comparison and the identification of lessons learned.

Fort Resolution

The opportunity for developing a north-south partnership came at a critical time for *Deninu* School in Fort Resolution. The Principal, Dan Summers, spearheaded the partnership with our research team with the intention of extending existing "on-the-land" programming. He highlighted the importance and timeliness of the initiative:

> Believe me, your program is going to have long-term effects. This is something we have been wanting to do for the last three or four years—getting into a net program.

As identified by community needs, the program began with two primary objectives: (1) to teach youth land-based food harvesting and preparation skills, and (2) to increase local consumption of wild foods. The funding supported the initiation of a local fishing program during winter months (December-March, 2012-2014). Initial funds were used to purchase supplies such as fish nets and gas for snowmobiles, and support the participation of several community harvesters. Under the supervision of local harvesters and school staff members, students from senior kindergarten class (age five) to grade 12 (age 17+) participated in the

[7] Our research team members were co-investigators on a Coalitions Linking Action for Science Prevention (CLASP) initiative, funded by the Canadian Partnership Against Cancer (CPAC). We worked with seven rural Indigenous communities across Canada to build and implement community-led land-based programs. Both Fort Providence and Fort Resolution decided that their local school would be the central node of their programs.

process of setting fish nets under the ice on Great Slave Lake and harvesting fish from the nets. Through intergenerational knowledge sessions, harvesters and Elders shared knowledge about fish harvesting, preparation, and preservation methods, as well as the importance of sharing and consuming wild foods for health and cultural continuity. Ted Moes, a teacher who was integrally involved with the program, emphasized the value to the community:

> Ice fishing is an ancient tradition in this community...having our kids active in the winter and on the land learning new skills and interacting with Elders is important to the survival of our culture, our language and even who we are as people.

During the first winter, the programs were hampered by unusually cold and windy conditions. A multi-week cold snap in December and another in January limited the time frame within which nets could be set and safely checked by students. This constrained student participation, especially for the younger grades. Regardless, the program still brought in considerable quantities of local fish (mainly whitefish, pickerel, northern pike, and lake trout). Some fish was consumed by students through the school's healthy snack program and the rest were stored in school freezers for distribution to community members. Following the first year of the program, Summers commented on how he imagined it progressing during the next season:

> The kids get out there and help collect the net and the fish. And the next step after that is to have some of the older kids, particularly from the kitchen program, process some of the fish. We will have one or two Elders come in and they will help thaw and process the fish to get it ready for the smokehouse.

In the second year of the program, additional harvesting and processing equipment was acquired. Major purchases included a fish smoker and sleds for hauling gear and students. In year two, the weather proved to be less of an issue and all grades spent several days out on the ice. More than three times the initial amount of fish was harvested in the second season. The smokehouse, built on school property with the guidance of Elders, enabled students to learn about both traditional and modern smoking techniques, and participate in preserving the fish. Students participated in the entire food procurement process through the program, including setting nets, harvesting, preserving, packaging, and distributing hundreds of fish. In addition to providing for the school's healthy snack program, fish was also delivered to more vulnerable community members who had limited access to wild foods.

The program, led by staff members, Elders, and local harvesters, had some notable successes; however, there were also some significant challenges. Initially some community members expressed concern about contaminant levels in local fish from Resolution Bay, which lies adjacent to the community. Much of Great Slave Lake is considered a relatively pristine waterway and fish of most species are eaten regularly by local Indigenous and non-Indigenous

populations; however, observed changes in water quality and quantity, combined with the largely unknown impacts of local community activities, legacy impacts from the nearby Pine Point mine (e.g contaminants leaching from waste piles), and downstream impacts of resource extraction and other industrial activity has raised questions about whether the fish are safe to eat. In response, the traditional knowledge program was linked with a scientific research project that included toxicological testing of fish caught during the first year of the program, which helped to alleviate concerns. Another challenge was related to mid-project changes in leadership at the school. However, multiple staff members had participated in and committed to pursuing the fishing program, thus reinforcing its resilience. Maintaining sustainable funding to establish more permanent programming is always an issue for small communities. As Moes alluded to, sustainability is critical for programs to reach their potential:

> The biggest change that we have noticed is the youth excitement about being on the land and being involved in related programs...Having children excited about these programs that teach them critical skills and allow for important discussions about food security and community health is helping create a sustainable future of the programs and the community in general.

While sustainable resources for land-based programming is difficult for small Indigenous communities to secure within their limited human resources, once programs are formed, communities are often able to leverage funds from other sources. This is currently being pursued in Fort Resolution with local, regional, and southern partners (e.g., through research projects and government-supported programs).

Fort Providence

Similar to what transpired in Fort Resolution, the community consultation process in Fort Providence identified a number of critical objectives for the land-based program. In addition to the objectives of teaching youth land-based food harvesting skills and increasing local consumption of traditional foods, leaders and Elders also wanted to increase youth physical activity levels, support nutrition literacy for parents and youth, build relationships between the school and more traditional families in the community, and develop food distribution networks to ensure that vulnerable populations have access to local foods. To address these objectives, researchers, community members, and school staff worked together to implement multi-faceted programming. As was the case in Fort Resolution, the school became the centre of program activity. *Deh Gah* Elementary and Secondary School in Fort Providence implemented a multi-pronged wild foods snack program to engage students in learning about wild food harvesting through experiential education, and increase their consumption of these foods through a healthy snack program. The focus on building healthy habits is captured well by Lois Philipp, the school Principal:

> I think that if you look at the health implications of processed food in any Northern [Indigenous] population, it's going to be a tremendous impact at one point in terms of lifestyle, diabetes and all of that. So, if we can get them to build healthy habits and let youth see that relationship between diet, exercise and choice in the North – where we are much more blessed in the fact that we can go out our back doors and get our meal – if we can keep those skills up, then communities will always have a choice.

Initial funding was dedicated to program planning and the purchase of necessary equipment to allow the school to properly preserve snacks for the winter months. Investments were made in a vacuum sealer, jerky maker, smoker, and other tools to preserve locally caught fish and game. The school then worked to engage and build relationships with local harvesters who provided traditionally prepared foods to the school, led harvesting and food preparation activities with student groups on the land, and acted as resources during intergenerational knowledge sharing sessions. Students from senior kindergarten (age 5) to the senior high school (aged 17+) participated in harvesting and preparing wild foods, as well as consuming these foods through the school's snack program.

As was the case in Fort Resolution, the Fort Providence project provided the context for leveraging additional resources to extend the impact of local food procurement initiatives. This facilitated a university student to live in the community for a total of six months over numerous trips between May 2013 and February 2015.[8] She worked with a Fort Providence high school student to facilitate the food procurement programs, beginning with a 2013 spring camp for youth on the land. While the program had ample buy-in from school staff and community members, the hamlet simply did not have the human or financial resources to dedicate a full-time worker to initiate the camp. The two students worked together to organize staff, students, resource providers, and community members to come together and work towards harvesting fish and waterfowl to preserve as snacks for the coming year.

Students from all classes had the opportunity, with parental consent, to spend time on the land. Over the course of the first six-week spring camp, approximately 70 percent of the school's 185 students participated outside of the classroom. Students engaged in all aspects of wild food procurement on a daily basis with program staff, Elders, and resource providers. The daily catch averaged 20 fish, including northern pike, whitefish, suckerfish, and pickerel. All students took turns helping to prepare the fish for smoking over the fire. Lunch consisted of wild foods—often fresh waterfowl supplied by local resource providers—that students helped prepare and cook over the campfire. In addition to encouraging students to acquire a taste for these foods, they were also taught the importance of connecting with their roots, preparing traditional meals, and respecting the land and the food it provided. The Elders shared stories with the youth and taught traditional games, skills and values. For some students, spring camp and other school outings

[8] Funding for the university student was provided by the University of Ottawa's *Students for Canada's North* Program.

were the only opportunities they had to spend time on the land. Elder and guidance counsellor Margaret Thom emphasized the importance of the spring camps for local youth:

> By giving these camps focus and direction, youth were able to develop skills that are important to our culture and way of life. Our students show signs of increased self-esteem and community relationships through these skills.

A significant exchange of knowledge took place over the six-week period as students became more accustomed to processing the fish and waterfowl. In addition to the daily wild food meals consumed at the camp, the students were able to preserve over 300 fish for the upcoming winter months to provide for the school snack program.

In the fall of 2013, the programs were expanded to include the fall and winter harvest. High school students traveled a considerable distance from the community down the Mackenzie River by canoe with Elders, community members, and school staff. They learned from and with local experts on the land while gaining course credit. In addition to identifying and harvesting edible plants and medicines (including wild mint, spruce gum, sweetgrass, Labrador tea leaves, high and low bush-cranberries, and birch paper) from the land, they also processed fish and waterfowl to be preserved for the school snack program. In the winter, the focus turned to setting rabbit snares and beaver traps as well as ice fishing. All of these programs were repeated in the second year (2014) with increased levels of participation and yields.

Despite its successes, the wild foods snack program also encountered several challenges. One barrier to winter harvesting related directly to the geography of the community. To set fishing nets under the ice, residents are required to travel a fair distance, which requires significant time investment and planning, especially when students are involved. This contrasts with Fort Resolution, which is situated directly on the shore of Great Slave Lake (see Figure 1). Another notable challenge was the limited level of parental involvement in the school's snack program activities, despite outreach and engagement efforts. As in many small rural Indigenous communities, locally-available human resources were limited and stretched to capacity; however, these are essential for program continuity and sustainability. While there was ample buy-in to the wild foods snack program by key school staff members and resource providers, many are overburdened by other—often employment-related—commitments.

Discussion: Building relationships and capacity for Indigenous food security

The intent of the profiled land-based wild food programs is to contribute to food security and community well-being in multiple ways (Table 1), as highlighted by Fort Providence's Vice Principal Jim Snider:

> We have been able to build relationships with community members, Elders and parents who have strong land-based skill sets that are now acknowledged and privileged within an educational institution. While bringing food access to the community has been a great benefit, the relationship building that the funding has facilitated is extremely beneficial and will continue to have positive effects.

Each program addressed a range of aspects of wild food procurement, including education, cultural continuity, social networks, consumption, and distribution, which relate to specific food security pillars. These programs increase both *access* to and *use* of wild foods at the local scale, whereas wild food *availability* and *quality* often rely on broader processes of wildlife and environmental management. As such, these programs acted as holistic local-scale adaptation strategies in the face of environmental change. Their impact goes beyond simple capacity-building for increased food access, and should therefore be evaluated in the broader socio-cultural community context that recognizes contributions to relationship-building, knowledge transmission, and cultural continuities.

Table 1: Contribution of Land-Based Programs to Community Food Security and Well-Being

Well-being element	Activity	Food Security Pillar
Education	• Increased knowledge of wild food harvesting, preparation and consumption for youth	• Improved food *use* through knowledge sharing
Cultural continuity	• Supported land-based initiatives and local cultural and linguistic practices • Facilitated inter-generational knowledge sharing between Elders and youth	• Improved food *use* through knowledge sharing
Social networks	• Facilitated relationships between harvesters, staff and children at the school	• Improved food *use* through knowledge sharing • Increased *access* to wild foods
Food consumption	• Provided wild foods to youth and community members	• Increased *access* to wild foods
Food distribution	• Formalized distribution methods for wild foods in the community	• Increased *access* to wild foods

Through our experience with these two community programs in Fort Providence and Fort Resolution, NWT, our research team—in collaboration with community partners—identified several key factors that contributed to successful outcomes. Both of the abovementioned land-based programs were developed to fit the specific, unique local context. They were built around local values and customs, helping community members to reclaim cultural practices and convey

foodways knowledge to younger generations. Creating linkages between Elders and youth is an effective way to bridge the existing knowledge transmission gap. A focus on reclaiming cultural practices and supporting cultural continuity incentivizes community member engagement, particularly when youth are involved. In this context, addressing aspects of health and well-being, as well as food autonomy (which is related to self-determination), speak to issues of key importance for both individuals and the community at large.

It is important for the focus on youth to be explicit, regardless of whether youth is the primary target group or an identified component thereof. Working with younger generations has multiple advantages, including the development of a "taste" for wild food early in life, normalization of wild food as part of a healthy diet, and the de-stigmatization of wild foods which may be seen by some as inferior and anti-modern (Robidoux et al., 2009). It is also likely that youth will share knowledge with other family members and friends, thus providing a knowledge translation mechanism at the community scale. Among other benefits, these programs contribute to strengthening culture and social ties, contribute to the physical health of students in the community, and also support increased food autonomy through local capacity-building. By engaging students and other community members over a multi-year period, such programs become part of the positive culture of the school and community, thus activating existing resources (e.g., volunteer work by community members, dedicated student work as part of their community service hours, and summer internships).

The community-directed nature of these local food procurement programs provides a foundation for the successes achieved in each community. Programs must be community-led to ensure that they respond to local needs and are feasible in the existing context. In both case studies, the school Principals had a passion for land-based education, a vision for how to improve it, and the ability to integrate program activities into the existing curriculum. These individuals committed considerable time and resources to planning, implementation, and reporting, including both financial and logistical aspects. Key staff members at both schools were also integral to program success, as was the interest and motivation of knowledgeable Elders and harvesters. It is essential that such programs have a community champion and dedicated human resources at the local level. Ideally a team of community champions would be established to share roles and time commitment, and provide continuity in case of changes in leadership.

In both case studies, project funds were used to leverage additional funds from other sources, both by the research team (e.g., internal university programs and external research assistant support) and by the community partner (e.g., territorial government funding). This improved program alignment with other activities enabled the extension of program activities where needed and provided a basis for program sustainability. This ability to seek out and capitalize on complementary funding opportunities requires flexibility and an ability to think creatively about how to effectively build on the initial program and realize additional benefits. Strong community-academic partnerships can expand the potential for leveraging from different sources.

When dealing with wild food procurement, the aspect of seasonality is an essential consideration. Harvesting timeframes vary by species and season, and are often fairly specific. Thus, it is imperative that the timing and logistics are well planned and communicated to ensure that they match local conditions and harvester availability, while also ensuring compatibility with funding regulations and deadlines. At the same time, program partners and associated funders must be adaptable and responsive to local priorities and changing circumstances, such as program changes due to weather and cycles of turnover in local leadership.

Sustainability is a key challenge for community-based wild food programs in northern communities, as they rely on continued funding and community engagement. While good ideas can stimulate action, certain conditions must be in place to implement effective programming. Despite certain similarities, each northern Indigenous community provides a unique context, thus limiting the utility of a one-size-fits-all approach. At the same time, the complexity of food security issues requires a multi-faceted approach. Intervention programs require both initial capital input as well as a longer term plan for continuity. Program design must be considered from the beginning to ensure that sustainability planning is both incorporated and feasible. Additionally, accountability is critical when using government funds. Program coordinators require an effective system for documenting expenses and maintaining open and transparent communication throughout the process. A related aspect is the need to address potentially competing visions within the community. Broad community support is required for program sustainability over the long term, thus requiring transparent and open dialogue among interested stakeholders.

More specifically, the program in Fort Providence has achieved a level of sustainability, due to several key factors: a) the commitment, passion and longevity of a dedicated community champion; b) existing momentum and a positive culture relating to land-based education practices; c) the availability of and capacity to access and leverage resources (financial, human), as well as flexibility, openness, and a willingness to engage with external people and processes; d) a reasonable level of autonomy of the partner organization (e.g., the school) to implement the program and connect it to other activities. The community-based approach was essential to achieving this, as it allowed participants to identify needs and allocate resources in appropriate ways.

Conclusion

Environmental change in the upper Mackenzie River Basin has significant impacts on food security, human health, and well-being, as well as links to cultural identity (Wesche & Armitage, 2006). Clearly, northern communities must implement adaptation measures to increase food security and maintain well-being in the face of climate change and other stressors. Community-driven programming can offer an effective mechanism through which to build local capacity for wild food procurement, and schools can play a key role. At the same time, efforts must be made

to overcome barriers and ensure the effectiveness of intervention programs. While changing social and environmental conditions create diverse challenges for the current generation, targeted programs can support the acquisition and application of traditional knowledge and skills for residents of all ages. A focus on land-based activities and connections with the land can also play a key role in addressing root causes of current challenges to social cohesion and well-being (Pearce et al., 2011; Anuik, Battiste, & George, 2010; Samson & Pretty, 2006; Mason, 2014; Takano, 2005; Alfred, 2005; Alfred, 2009). As a result, the "land" in and around communities offers an excellent and often under-utilized educational resource.

Kuhnlein et al. (2006) highlight the importance of taking a grassroots approach to building local capacities to address local concerns. This encourages community engagement, allows for the inclusion of traditional knowledge, and improves the likelihood of success of local programs. Existing culturally-relevant programming in community schools (e.g., related to language, sewing, or traditional knowledge) offers an excellent foundation for developing community-driven programming around wild food procurement. While both diversifying the curriculum and increasing local relevance, the resulting programs may also help to counteract current under-utilization of local knowledge and wild food resources, thus effectively expanding access to the existing resource base.

A diverse range of possible interventions are available to individual communities at any point in time. To ensure effectiveness, our partner communities emphasized that programs must be bottom-up, ensure that local champions and resources are in place, effectively target specific community sub-groups, and remain culturally appropriate and viable considering existing priorities. The stability of food resources over time is also an important parameter, thus adaptive strategies must be sustainable to ensure long-term effectiveness.

The case studies presented here offer insights for the development of effective wild food procurement programs. While these types of programs are no panacea for local food security issues, they are part of an evolving strategy to manage and respond to the changes encountered by communities. While providing some short-term benefits around increased food access and caloric intake for youth and community members, such programs should really be seen as long-term investments to influence how individuals and communities think about and approach food procurement, thus helping to rebuild local food systems and sovereignty. In this context, both communities and researchers should recognize the value of partnerships that bring together complementary interests and expertise to address pressing food security issues (Andrée et al., 2014). At the same time, many Indigenous communities are facing similar food security challenges in other parts of the world, and may benefit from the insights presented here.

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Original Research Article

The dilemma of scaling up local food initiatives: Is social infrastructure the essential ingredient?

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Abstract

In this paper we examine two responses to the challenge of scaling up local food initiatives (LFIs). Comparative case studies of the City of Edmonton's Good Food Box and the Rimbey farmers' market, both located in central Alberta, are analysed to compare the different strategies used to scale up their impacts and provide a meaningful alternative to the status quo. LFIs offer a variety of context-specific responses and values that aim to challenge the global, conventional food system. In attempting to be viable, many LFIs focus on securing physical infrastructure. Our findings suggest that investment in social infrastructure is crucial for maintaining the values and integrity of LFIs; nevertheless, there are challenges of doing so when competing with the mainstream food system where price, efficiency, and convenience rule. Social infrastructure provides opportunities for a reflexive scaling up by identifying the levers and catalysts for longer-term transformative change. Investments in social infrastructure can support radical and strategic incremental changes by managing associated risks. We conclude that social infrastructure is critical for building support for, and attention to, opportunities to develop connections, networks and partnerships for change within the food system and beyond.

Keywords: local food initiatives; alternative food initiatives, scaling up; social infrastructure; physical infrastructure; reflexive change

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Introduction

In 1977, Frances Moore Lappé and Joseph Collins suggested that grappling with food issues "provides the most useful tool in making sense out of our complex world (p. 3)." Since that time, concerns about health, the environment, local economies and rural communities have shaped the emergence of a wide range of alternative LFIs. Some take their cue from the 100-mile diet or the organic food movement. Others are driven by support for re-localization of economic activity, preservation of farmland, and the family farm. Still others are influenced by peak oil and climate change impacts. There are inspiring and diverse examples of LFIs from around the world that have made significant inroads in raising awareness about where our food comes from, how it is produced, and how waste is addressed. They have influenced markets, generated new business opportunities, and shifted agricultural production from export to satisfying local needs (Marsden & Smith, 2005). Recent analysis from the United States shows the rapid growth of local food purchasing in the country: a 27% increase from 2008 (USD $4.8 billion) to 2012 (USD $6.1 billion) (USDA/ARMS[1]); a 33% increase from 2013 (USD $9 billion) to 2014 (USD $12 billion) (AT Kearney, 2015); and a predicted 9% annual growth into 2018 (AT Kearney, 2015).

Similar upward trends are emerging in Canada. The province of Alberta, where the agri-food industry has been dominated by large scale, export-oriented crop and livestock operations, has experienced strong growth in production and processing for local markets as a result of increasing demand (AARD, 2013). In 2012, 93% of households surveyed purchased food grown or made in Alberta. Increased demand has spawned the growth of local food venues including farmers' markets, Community Supported Agriculture (CSA) initiatives, box schemes, farm retail, and restaurants. Average household expenditures at farmers' markets doubled from 2004 (CAN $317) to 2012 (CAN $617), a period that included a major economic crisis and recession (AARD, 2013). From September 2011 to August 2012 the total economic value of markets across the province was CAN $724 million, 90% more than in 2008 (AARD, 2013).

The fact that LFIs exist, are growing in number and economic value, and are part of broader global food security and food sovereignty movements to reimagine the food system (Larder, Lyons, & Woolcock, 2014), illustrates the "politics of possibility in the here and now" (Gibson-Graham, 2006; p. xxvi). Yet, despite strong growth in demand for local food and the success of many of these initiatives, their collective economic value is only a small percentage of total food sales. Large retail outlets, such as Walmart[2], are quickly capitalizing on demand for local food. In Alberta, mainstream retailers now capture 51% of the local food market (AARD, 2013). Can the impact of diverse, place-based and often small-scale LFIs be strengthened in order to transform rather than merely inform the conventional food system?

Efforts to scale-up LFIs tend to focus on the need for the physical infrastructure (e.g. distribution, storage, retail space, etc.) without sufficient attention to the social infrastructure

[1] http://www.ers.usda.gov/media/1763057/ap068.pdf
[2] http://corporate.walmart.com/global-responsibility/environment-sustainability/sustainable-agriculture

(e.g. governance, relationships, networks, values) and the socio-political movements that give rise to these alternatives in the first place (Bloom & Hinrichs, 2011; Connelly, Markey, & Roseland, 2011; Friedmann, 2007). Food hubs (Cleveland, Müller, Tranovich, Mazaroli, & Hinson, 2014) and local procurement policies (Morgan & Sonnino, 2007; Friedmann, 2007) are examples of strategies used to stimulate the scaling-up of LFIs by increasing demand for local products, create economies of scale, and provide greater access to consumers.

Approaches that "piggyback" on conventional food system infrastructure (such as existing distribution networks, warehousing, storage and processing facilities, etc.) have received significant attention, while alternative ways in which that infrastructure might be used and shared (such as cooperative distribution, shared facilities, consumer-producer partnerships) have been under examined. Bloom & Hinrichs (2011) found that strategies that relied on conventional food system infrastructure to move food from field to plates struggled to create a sense of partnership as various actors used food system infrastructure for competing purposes. They found that the focus on physical infrastructure was a distraction from developing appropriate governance structures, a sense of shared ownership, equity, and trust among food system participants (Bloom & Hinrichs, 2011). While utilizing conventional food system infrastructures may be effective in getting more local food to more consumers, it does not provoke examination of the un-sustainable practices of the food system nor thinking about ways that food can aid in the sustainable transformation of communities. The use of infrastructure needs to be linked more explicitly with alternative food system goals (Stevenson & Pirog, 2008).

The purpose of this paper is to examine and compare two responses to the challenge of scaling up LFIs in Alberta. We conducted comparative case studies of the Good Food Box program in the City of Edmonton and a farmers' market in the Town of Rimbey, both located in central Alberta, to examine the different strategies used to provide a meaningful alternative to the status quo, and the opposing values and objectives that influenced the choice of strategies and the eventual outcomes for each initiative. These examples illustrate the different roles of physical infrastructure and social infrastructure in LFIs, and the tensions that can arise during attempts to scale up their scope and impact. Our findings from these two case studies suggest that investment in social infrastructure is crucial to maintaining the values and integrity of LFIs, and can also result in measured scaling up and lower risk than investing more heavily in physical infrastructure or relying on what is available through the conventional food system. We use these comparative studies to add to previous analysis of the role of social infrastructure in scaling innovations for sustainability (e.g., Beckie, Kennedy, & Wittman, 2012; Howaldt & Schwarz, 2010; Kirwan, Ilbery, Maye, & Carey, 2013; Smith & Seyfang, 2013).

Literature review

LFIs and the dilemma of scale

LFIs can be characterized by their focus on locally controlled, shortened supply chains that attempt to trade on the basis of social, environmental, nutritional, or health qualities, often by re-embedding the economy within social networks (Winter, 2003; Seyfang, 2006; Larder, Lyons, & Woolcock, 2014). LFIs take many forms. *The Stop*, in Toronto, serves as a community food centre that supports community gardens, produces food for their food bank and community kitchens, provides meeting space for food democracy and justice movements, and has been a key driver in food policy in Toronto (Levkoe, 2006). Similarly, *Growing Power* in Milwaukee serves as an urban farm and educational centre that addresses issues of race, inequality, community building, and public health (Allen, 2012). Entrepreneurial approaches, like Small-Plot INtensive (SPIN)-Farming in urban settings, focus on high-value crops marketed directly to consumers to improve the profitability for farmers while integrating agriculture into the built environment (Christensen, 2007). Farmers' markets (e.g., Beckie et al., 2012), community supported agriculture schemes, good food boxes and local food hubs (Beckie & Connelly, 2016), and urban planning (Mendes, Balmer, Kaethler, & Rhoads, 2008) provide opportunities for direct interactions between producers and consumers who seek ways to reconnect and "opt-out" of the "disembedded" and globalized food system (Goodman & Goodman, 2009). The value of LFIs rests not in a replicable, one-size fits all model that can be rolled out across places, but in the differentiated way that individual places respond to the shared challenges and impacts that result from the global, conventional food system. LFIs provide a diversity of context-specific responses and solutions to local challenges created by the conventional food system (Blay-Palmer, Sonnino, & Custot, 2016)

While there has been an expansion in the number and diversity of LFI approaches, their ability to achieve social, economic, and environmental change is limited by their scale and their position within a broader food system (Jarosz, 2008). In addition, important critiques of LFIs have emerged based on the "local trap" (Born & Purcell, 2006), the selective participation of privileged sectors of society (Allen & Guthman, 2006) and the fixation on authenticity, defensive localism and the "othering" of the non-local (Winter, 2003). These critiques have been effective at generating attention, in theory and in practice, to reflexive localisation that openly questions the values and assumptions of specific LFIs (Levkoe, 2011). While many LFIs have arisen out of a broad ideological commitment to sustainability, food security, and social justice, they often struggle to implement this commitment in their daily practices (Connelly, Markey, & Roseland, 2011). Attempts to transform the food system reveal conflicting tensions, challenges and opportunities as LFIs navigate the difficult terrain of remaining viable alternatives to the conventional food system within their local contexts, while also contributing to a broader social movement that uses food as a platform and a catalyst for social change (Hassanein, 2003; McClintock, 2013).

How can LFIs remain viable within a system dominated by large-scale global distribution networks? There are significant resources and interests aligned with the agro-industrial model, ranging from global financial markets, foreign investment in agricultural land, and the influence of global trade agreements (Rosin, Stock, & Campbell, 2012; Clapp, 2013). LFIs struggle to scale-up the appropriate economic, organizational and physical infrastructure so as to be competitive within the larger food system, while still maintaining social and environmental values and goals that the conventional food system undervalues (Cleveland et al., 2014). This dilemma of scale often results in LFIs making trade-offs between increasing their reach and impact, and their commitment to values-based transformation of the food system. They are faced with scaling-up rapidly by mimicking the conventional system and risk becoming appropriated in the process, or methodically assessing their unique assets, commitment and goals as a means of using grassroots innovations to expand their impact (Smith & Seyfang, 2013).

The role of social infrastructure and social innovation

Governance structures and the relationships among food system actors can be referred to as social infrastructure, which defines a political and social space where participants can generate and utilize social capital to advance LFI values and objectives. Social infrastructure consists of the interactive aspects of organizations and institutions that allow them to function as a group (Flora & Flora, 1993). Nauwelaers and Reid (1995) describe the critical role of social infrastructure in regional innovation, referring to the set of economic, political, and institutional relationships occurring in a given geographical area that generates a collective learning process leading to the rapid diffusion of knowledge and best practice. In contrast to physical infrastructure, social infrastructure is intangible and determines how we use physical infrastructure, for what purposes and how control over it is governed (access, user rights, responsibility for provision, etc.). Flora and Flora (1993) identify the institutions, organizations, and groups of people working on common goals that comprise social networks, and the capacity of these networks to innovate, mobilize resources, and link up with outside expertise and resources, as critical assets of social infrastructure.

Previous research in a range of sectors suggests that context-specific social innovation results in changes in practice by re-imagining how actors might interact with each other and with existing structures and institutions to transform the power dynamics of existing systems (Moulaert, Martinelli, Swyngedouw, & Gonzalez, 2005; Smith & Seyfang, 2013). Social innovations are new forms of civic engagement, participation, and empowerment that change the direction of social and economic practice by generating new ideas, new interactions, and new activities that meet multiple social goals (Neumeier, 2012). In the context of LFIs, this involves paying equal attention to the function of physical infrastructure and the social innovations that give rise to social networks, governance rules, and political support that provide a purpose for pursuing alternative food system goals. Flora and Bregendahl (2012) illustrate the role that social infrastructure plays in collaborative CSAs, where the interactive nature of collaborative social structures contribute to the enhancement of community capitals (social, political, cultural, economic, financial, built, and natural) by providing for on-going

relationships between food system actors. The *community capitals* framework (Flora & Flora, 2013) emphasizes the need to balance investments across all types of capital and not to assume that investments in one type of capital can off-set disinvestment in others.

The collaborative component of the CSA is an example of the social infrastructure required to enable communication, commitment, trust, and relationships that are necessary to share the risk and benefits of farming for the local market in a way that achieves multiple community benefits. Jarosz (2000) points to the value of understanding the social relations that exist along the food value chain, which are critical for strengthening viability and vibrancy of alternative food initiatives. It is the social relations among actors along the supply chain that enable the exchange of food information and resources that determines how food gets from fields to plates, and the way in which food is valued. Too often, a false divide is created between food production and food consumption, where production is viewed as a technical activity, while consumption is seen as a social activity (Lowe, Phillipson, & Lee, 2008). As a result, attempts to create an alternative local food system often resort to placing greater attention on the physical infrastructure needed to get food from producers to consumers and fail to recognize the social relations of production and the technical relations of consumption.

It is assumed that local and alternative food systems are more socially embedded and therefore contribute to re-establishing relationships of trust and accountability between food system users (Sonnino, 2013). It is also argued that the social embeddedness of local food systems provides the basis for re-imagining food systems that use new and existing infrastructure in innovative ways and provides greater benefits for local communities (Feenstra, 1997). In this way, the embeddedness of alternative food systems is the basis on which concerns about sustainability can be re-framed, re-read and re-generated (Gibson-Graham, 2006). Therefore, local food system advocates need to focus more on the social infrastructure—namely, how to use infrastructure differently, and how to generate resources and capacity on a more collective basis.

Critical to the evolution of new social relationships and structures that support alternative food systems is collective action, with social infrastructure being at the centre of any transformative change to food system practice (Kirwan et al., 2013). Social infrastructure creates the capacity for communities to challenge the mainstream, develop alternatives and take action in creating social and cultural change rather than just economic growth (Seyfang & Smith, 2007). Capacity refers to the ability of community to make changes by drawing on the resources available to them individually and collectively (Middlemiss & Parish, 2010).

Having examined the complexity of establishing LFIs and the tensions, conflicts and challenges that arise, we first provide a brief description of the methods used in data collection and analysis, and then turn to two examples of LFIs from Alberta, which we use as the basis to explore the potential for practices in particular places to lead to meaningful change in the food system. Our case studies highlight the conflicts that emerge as a result of competing values and uncertainty of outcomes, and offer insights into how tensions and conflicts can be addressed while continuing to balance pragmatic short term actions with broader goals of food system transformation.

Methods

We utilize and compare case studies (Creswell, 2009) of two LFIs that were part of a larger study of social economy initiatives that advance sustainability (Gismondi, Connelly, Beckie, Markey, & Roseland, 2016), to examine the challenges and tensions associated with scaling-up and scaling-out local food projects in particular places. Case studies are, however, bounded by time, location, and focus (Creswell, 2009). The cases selected here were not intended to be representative of the diversity of LFIs that exist, but rather were chosen because they presented interesting examples of local responses to address broader sustainability goals through improving greater consumption and production of local food. Relying on two unique initiatives and the "force of example" provides context-dependent knowledge that allows for themes to emerge from the analysis (Flyvbjerg, 2006).

The case studies and subsequent analysis are based on semi-structured interviews (45–90 minutes) with key local food stakeholders in Edmonton and Rimbey over the period 2008-2015, as well as analysis of secondary sources, including related documents, websites, grant applications and annual reports. In each case, we sought to better understand the challenges, opportunities and tensions that LFI participants faced in their attempts to change the food system. For the Edmonton case, 11 interviews were conducted with Good Food Box organizers and customers, local food activists, local farmers, and members of the City Council in 2010. Subsequent follow-up telephone interviews were conducted in 2012 and 2013 to update information as the project evolved. For Rimbey, 11 interviews were conducted in 2008 with the market manager, vendors, customers, elected officials, and a provincial government employee responsible for overseeing farmers' markets. Follow-up interviews with the market manager were conducted in 2010 and 2015.

In both cases, interviews were both recorded and transcribed or detailed notes were recorded by the interviewer that were subsequently coded using a mixture of inductive and deductive methods. The results from the key informant interviews and secondary sources provide the basis for the case study narratives that follow. The focus on social infrastructure emerged from our qualitative thematic analysis (Cresswell, 2009) as we attempted to come to terms with drawing lessons from these two different LFIs.

Findings

The Good Food Box, Edmonton

Plans for the redevelopment of Class 1 agricultural land in the northeast part of Edmonton served as a catalyst for discussion of the role of food in the City (Beckie, Hanson, & Schrader, 2013). The Greater Edmonton Alliance (GEA), a non-profit coalition of citizens, church groups, farmers, local businesses, and unions galvanized support for preserving one of the last tracts of agricultural land within the City limits to raise awareness of problems with the existing food system and to link food and land use policy for city planners, politicians,

and the broader public. The broad-based citizen's movement was successful in raising awareness of the value of the agricultural assets of the northeast sector of the City, including the unique micro-climate, soil capabilities and moisture content, and overall productive capacity for contributing to a more sustainable food and agriculture system for Edmonton (City of Edmonton, 2009). The efforts of GEA are credited with motivating widespread public concern for local food systems in the Edmonton region and to the development of the City's food and agriculture strategy in 2012 (Beckie et al., 2013). It was out of this context that the Good Food Box (GFB) emerged to build on the emerging enthusiasm for local food and to link concerns over redevelopment, urban sprawl and local food systems more generally.

Raising awareness of the value of local food for consumers and the community at large was seen as a key component of a strategy for farmland preservation. GEA organizers recognized that increasing the viability and profitability of local farmers would reduce the pressure for redevelopment. However, the conventional food system dominated by supermarkets provided little incentive for collaboration, which limited consumer access and awareness of local food while at the same time limiting distribution opportunities for producers. Outside of the weekly farmers' market, there were few venues for consumers to access to local food. Likewise, local farmers and producers had limited access to provide their products to consumers. While selling at the farmers' market provided direct access to consumers, it also took the farmer off the farm at critical parts of the growing season. In addition, the lack of local food wholesalers made it difficult to access the restaurant industry. Chefs wishing to source local food often had to buy from multiple producers in order to get the volume required, but faced challenges in addressing other parameters such as quality, size, shape, flavour, and consistency. A restaurant owner commented on the importance of relationships, but also their high temporal cost, stating "growers, consumers, institutional buyers, processors and restaurant owners have limited opportunities to interact and as a result personal relationships and connections have been removed in favour of pursuing efficiencies and economies of scale." Many were unwilling to make this re-investment in time and energy.

Lack of collaboration was highlighted by one local producer who stated "producers need to work together to create a sense of interdependency rather than competition so that the significant costs, risks and benefits of investing in local food infrastructure can be shared." For some producers, trust, reciprocity and collaboration were identified as being critical for re-building the local food system. However, it was also dependent on raising consumer awareness of the true costs of food. One farmer commented on this challenge, stating:

> The trade-offs, costs, and benefits between standardized global food systems and flexible localized food systems need to be more apparent to consumers. If consumers really want a more resilient food system, they need to be willing to accept that food is not a standardized product such as toilet paper. It will come in different shapes, sizes and tastes.

The GFB was set up in 2009 as a social enterprise pilot project with a purpose of increasing the availability of locally produced food for families in the Edmonton area and with the aim of evolving over time into a fully independent cooperative. Existing producers from the farmers' market were contracted to contribute to a weekly food box that customers paid for in advance for the season. The GFB was designed to provide convenient access to affordable fresh produce for consumers, provide fair market value for producers, to expand marketing and distribution opportunities for producers, be accessible to all and to create jobs for inner-city residents. The GFB ran for six continuous weeks of delivery in 2009, and was expanded to the entire growing season in following years.

The project was initially designed for 110 participants; however, when a call for interest was released, over 1,000 people signed up. GFB organizers were unable to cope with this demand due to limitations in delivery trucks, storage and packing space and sufficient local produce. Distribution was curtailed in the first year: 236 bags of fresh produce were delivered per week; 31 were subsidized for clients of the Edmonton Food Bank. Customer surveys at the end of the year indicated that 88% of the participants were extremely or very satisfied with the quality of the produce and the price. When asked why they participated, 63% stated support for local farmers as their primary reason, with 53% stating support for local food security as their secondary reason. The GFB was successful in building on the emerging local food movement in Edmonton that was created by the opposition to land redevelopment and in generating a values-based commitment to local food that saw food as more than just a commodity. However, there were considerable barriers that prevented food activists (both producers and consumers) from acting on their values, primarily related to the infrastructure requirements of getting food from field to plates.

Local food distribution was fragmented and underdeveloped within Edmonton, and the GFB program was seen as one way to build the connection between the farmers and consumers by providing an alternative to the supermarkets while also maintaining a connection to the social and environmental values that gave rise to interest and concern about local food issues in Edmonton. As one GFB customer and volunteer stated:

> I think most of the people I know that have joined up with the GFB did it as much for the good food as for the political reasons because they didn't want it to fail. Right now we are hoping to try and reach out to people who maybe aren't that, who just want the convenience and I think you still have to be a little bit convinced that it's good because you don't get to choose your vegetables and choices are made for you.

In order to provide more food to more people in neighbourhoods throughout the City, the GFB focused on increasing physical infrastructure: warehousing space with cold storage and additional delivery trucks. They also focused on increasing consumer choice. In the 2010 and 2011 seasons, they developed a pre-order purchasing website to expose customers to the range of available products and increase shopping convenience. While the GFB was still committed to organic and sustainable production where possible, it was no longer limited to locally sourced products. Instead, it focused support on businesses that operated locally in

order to access a greater volume and range of products on a year-round basis. As the program scaled-up, it catered to a more upscale, niche consumer market, with prices for products that reflected those demographics. For example, consumers were able to purchase frozen prepared meals, imported seafoods, meats, seasonings, chocolates, breads, and vegetables, in addition to the standard range of fresh produce available through the food box program during the growing season.

The initial grant that subsidized low-income access was not renewed as the GFB shifted from a social enterprise to a local non-profit organization dedicated to supporting independent and local businesses in the Edmonton area. To off-set this change, one percent of total GFB sales were committed for donation to the Mennonite Central Committee. As the focus of the GFB shifted more towards increasing the volume of sales to offset the investments in physical infrastructure, tensions emerged about the commitment of the GFB towards an alternative to the existing food system and the explicit focus of contributing to a broad local food movement was eroded. These tensions resulted in some of the original members of the GFB leaving the program and running their own bulk buying club out of their kitchen because they did not feel that the GFB was paying enough attention to the values and politics of local food.

The GFB ceased operations in 2012[3] as it was not generating enough revenue to justify the expenses. The GFB was unable to match the supermarkets on price and convenience, and the original values-based commitment to an alternative food movement in the City had also been reduced. The demise of the GFB can be explained in part by an attempt to scale-up too quickly to off-set investments in physical infrastructure by capturing the interests of a broader consumer base that may not have had the same commitment to an alternative food system. In doing so, the GFB neglected the social base of values and people that were part of the action to address wider food, agricultural land, and redevelopment issues in the City.

The Rimbey Farmers' Market

The Town of Rimbey[4] (population 2,496) is located between Edmonton and Calgary, in Ponoka County (population 50,000) in central Alberta. The County has well established agricultural and oil and gas industries that support the largely rural-based economy. The agricultural industry is predominantly characterized by large-scale crop and livestock operations but production of vegetables and fruits is on the rise, as is the direct marketing of fresh produce through seasonally operated farmers' markets. There are currently 12 farmers' markets concentrated in this region. Similar to other regions of Alberta and the rest of Canada, these farmers' markets are structured and run mainly as non-profit organizations.

[3] One of the growers that originally supplied the GFB has since started up the Organic Box as an independently owned and operated part of their farm. It supplies ~2000 boxes of vegetables a week to customers in Edmonton and the surrounding region.

[4] Town of Rimbey: http://www.rimbey.com

Rimbey is within close proximity to three large lakes (Pigeon Lake, Gull Lake, and Sylvan Lake) and provides most services to the surrounding farming population of approximately 12,000. During the summer months, thousands of visitors are drawn to these lakes and other recreational amenities of the region. This influx and the region's rich resource base significantly shape the local economy and creates employment and income opportunities. Unlike many agricultural communities in the prairie region that are declining due to out-migration, the communities within this region have remained relatively stable and economically viable. Strong local economies can be an important factor in the development of viable farmers' markets, however this is not always a given. As will be discussed below, the success of farmers' markets ultimately depends on local leadership and the embeddedness of the market in the community and the region.

Rimbey farmers' market was established in the late 1980s but by 2006 was on the verge of shutting down, with only seven vendors remaining. According to Rimbey market vendors, customers, and a Town Council representative interviewed, a number of factors influenced the decline of the market including: lack of leadership, vision and direction, a poor location, fading interest and support from the Town, and a reputation as having a poor selection of products in comparison to a number of other highly successful markets in the region. In 2007, the market experienced a revival with a new market manager, board of directors, and 42 new vendors. Within one year, the Rimbey market had become "a great reason to get up on Saturday mornings"—a rally call that has become the market's slogan. Since this time, the market has won awards from the Alberta Farmers' Market Association for its community atmosphere and the manager's leadership and innovation. The market manager explained that the market started to become successful once it began to contribute more to the social aspects of the community and transitioned away from a for-profit model that it was previously operating under. Her premise for this was that a locally embedded market can generate a unique community atmosphere that draws people in, and is not typically offered in the conventional food retail sector:

> I wanted to make the market a community event where people wanted to go on a Saturday morning, where they wanted to do their shopping, where they wanted to go meet for coffee, meet their friends. If you can make the market a really fun place to be, which is something that is lacking in our society…..Well, I think this is why farmers' markets are so important. We have people coming to the market and dancing. We have older senior couples actually ballroom dancing at the market. All this stuff gives a real sense of community.

A number of different initiatives have aided in bringing community spirit to the Rimbey market: hiring a small bus to pick up seniors; having a volunteer band play each market day; providing family-directed entertainment; supplying a free table for community organizations; and garnering support from local businesses through donations (such as doughnuts and coffee). Rather than being in competition with local businesses, retail managers have found the market to be a way to draw people into the Town, who often continue their shopping after the market. The market is also viewed as an opportune entry

point for expanding and diversifying production in the area and increasing access to local foods for residents, as evidenced by some of the vendors now supplying the seniors' lodge with fresh vegetables. There has been a desire to make this an environmentally-friendly market, so customers are encouraged to bring their own shopping bags and coffee cups. Every fourth Saturday is an "environmental solutions day", which focuses on local best practices and 'green' inventions, and an effort is made to get children and youth involved.

Through a relationship formed with the Rimbey Historical Society, the market is located on their attractive grounds and has access to buildings and infrastructure at a reasonable cost. The market manager has also worked to develop good working relationships with other markets clustered in central Alberta (Beckie et al., 2012). The region has a group of experienced managers that network with one another, sharing tips on promotion, market development, and potential new vendors, and are investigating ways to share costs and resources for a joint promotional campaign. Market managers in the region also collaborate to arrange market days and hours in order to avoid competition and overlap. This coordination enables the development of a 'market circuit', where it is possible for customers and vendors to attend multiple markets during the week. For example, Innisfail Growers, based in this region, is a partnership of five family farms that sell fresh vegetables at 13 different markets in central, northern, and southern Alberta, on every day of the week except for Monday.

The Rimbey market thus provides a good example of the benefits of investing in social infrastructure for the scaling-up of alternative food initiatives. The commitment to building relationships between community partners, responding to local needs and values, and creating an atmosphere that is unique and cannot be replicated by the conventional food system have all contributed to the success of this farmers' market. The regional clustering of farmers' markets also provides a valuable mechanism for scaling-up and scaling-out the social and environmental benefits, without having to make a major investment in physical infrastructure, such as would be required for the development of a regional food hub.

Discussion

The cases examined above describe two different LFIs that have contributed to the local food movement in Alberta by utilizing divergent approaches to influence the scaling up of their impacts and the trajectory of change. In this section, we analyze and compare the case studies with reference to the concepts of risk, scale, and infrastructure.

Sharing risk

Flora & Flora (1993) stress the importance of social infrastructure in managing risk in any attempt to transform actions. Who should bear the risk? Is it shared equitably among stakeholders? Should it be shared equitably? A process for determining what is an acceptable level of risk and who shares that risk is a critical component of social

infrastructure. The ability of stakeholders to manage that risk collectively is equally important. The loss of limited resources (both monetary, volunteers, and reputation) is a real threat and can pose a significant barrier to shifting practice from the status quo for consumers and producers alike. However, treating investments in physical or social infrastructure as a zero-sum game fails to acknowledge the interdependencies among the various forms of community capitals (Flora & Flora, 2013). Likewise, Roseland (2012) emphasizes the important role community mobilization plays in engaging stakeholders to strengthen all types of community capital. Social infrastructure is critical for balancing different types of capital and mobilizing stakeholders to engage in the risks associated with altering the status quo.

The challenge of coping with risk was particularly evident in the GFB case where one farmer discussed the dilemma of scaling up his production to supply additional food for the GFB program:

> I want to increase production, but is there really a guaranteed demand for my products? There are considerable risks and challenges associated with investing in scaling up local production, and I don't think those risks can be placed entirely on the back of producers. It's sort of like the chicken and egg question, farmers won't increase supply until they are certain demand exists, but it is hard to raise awareness for consumers if there isn't sufficient supply.

The GFB organizers recognized that what they were trying to do created uncertainties and risks for producers. They attempted to reduce this risk by focusing on investments in physical food system infrastructure (additional depots, cold storage facilities, warehouse, and delivery trucks) to increase access to local food through the GFB. These physical infrastructure investments were designed to expand beyond the niche foodie market by providing drop-off and home delivery options in suburban neighbourhoods and to increase the product range so that consumers had increased choice in a variety of products and ready-made meals. However, in the effort to scale-up the impact of the GFB, the focus on convenience for consumers had unintended consequences of alienating some of the supporters of an alternative food system for Edmonton. It also did little to shift the way both producers and consumers interacted. For example, a farmer highlighted the need to:

> …develop strategic collaborations among producers to share and address those risks. Producers need to begin to work together, to create interdependency rather than independence, for example, with cooperation around a shared warehouse. We also need to find a way to deal with consumer awareness regarding the challenges of supply. It's hard to work together, but that is what pays. We need to recognize that it is risky and hard.

Equally, consumers have a role to play. As one original supporter stated, "There is a lot of risk in marketing to where the consumer is at. If it is too easy, is it really a different kind of food system [we are creating]?"

The shift to online ordering and prepared meals undermined the focus on developing relationships between food system participants and building shared values about what a different kind of food system might look like in Edmonton. For some customers, supporting local producers, local businesses, and restaurants was of high priority. However, with the changes, other customers felt that GFB was no longer engaged with challenging producers and consumers to change the way they think about food or how they related to each other. They asked: How was the GFB different from the conventional food system, albeit on a much smaller scale, if the relationships between consumers and producers were limited to an online transaction? The commitment to a values-based approach to food and engagement with the politics of food was in question. Weakening social infrastructure linkages only elevated tensions between opposing views, which were never resolved. In the end, the relationships, networks, and linkages that were built through the coalition formed to fight for agricultural land preservation in the City, which led to the development of the GFB, were insufficient to accommodate the sharing of risk between producers and consumers for this initiative. Most of the risk burden was transferred to the GFB and when they were unable to generate sufficient sales, they ceased operation. However, they did open up a space for discussion of what kinds of LFIs are possible in Edmonton, and should be acknowledged for their contribution to the burgeoning local food movement in the City.

In contrast to the GFB, the Rimbey market has taken the position that "bigger is not always better" and focuses instead on community needs and values, which has aided its success and reduced the financial risk associated with expansion and investment in physical infrastructure. In fact, the manager spoke of limiting the number of vendors at the market so as to "keep its community atmosphere", and avoid the hectic frenzy of some of the larger, tourist-oriented markets. Unlike these markets, Rimbey's market has a predominantly local customer base which shapes what vendors sell and what social and educational activities are included. Building relationships with local community organizations and Town administration has also embedded the market in the community, such as its partnership with and location on the Rimbey Historical Society's grounds. By strengthening relationships with other market managers in the region, thereby contributing to an integrated and collaborative market circuit, they have also reduced the risk associated with a more competitive approach. The entire supply chain is strengthened when vendors and customers are given more market options, and when vendors can expand production to meet greater demand and can also enter into new market relations.

Scaling-up or scaling-out

Social infrastructure plays a critical role in addressing the dilemma of scale. Flora and Flora (1993) highlight the importance of vertical and horizontal linkages to provide a diverse source of knowledge and resources. In central Alberta, participation in the cluster of regional markets enables individual markets, managers, and vendors to create a collective competitive

advantage through expanded horizontal and vertical linkages, which enhance opportunities for collaboration, knowledge, and resource sharing (Beckie et al., 2012). Horizontal collaborations take place among vendors, market managers, and customers and help to shape the "business practices and enterprise development of vendors, in a relatively low-risk environment, by encouraging social learning and innovation" (Hinrichs, Gillespie, & Feenstra, 2004, p. 32). Vertical relationships with private, public, and social economy sectors extend the network both within and external to the community, and bring in outside resources. Strengthening social relations, trust, and collaboration, both horizontally and vertically, can give rise to social innovations that can aid in "addressing the challenges of scale, scope, infrastructure, and organizational capacity common in alternative food networks" (Beckie et al., 2012, p. 334). By placing greater emphasis on building its social infrastructure, the Rimbey market has adopted a strategy for scaling up that has not eroded its authenticity or detracted from the overarching objective of contributing to a more sustainable and socially just food system (cf. Wittman, Beckie, & Hergescheimer, 2012; Bloom & Hinrichs 2011; Friedmann 2007).

Through their efforts to scale up the impact of the GFB by enrolling more participants, there were insufficient resources (time, capacity, money) to adequately engage with how the GFB was going to be scaled out and to discuss the implications. For many, the focus on scaling up represented a failure to address the politics of food and a watering down of the values of equity and environmental responsibility. Initially, food activism in Edmonton was explicitly political and took advantage of horizontal linkages; as one City councillor described:

> It is not just about preserving land, but also about community gardens, about health, about making social connections, about the culture and the way we think about food in our daily lives. It really is a food system approach that has appeal across the diverse urban geography of Edmonton, appealing across the spectrum of citizens.

Similar to Flora and Bregendahl's (2012) findings on collaborative CSAs, the quote above illustrates the critical role that collective community capitals produced by participants played in creating a more local, sustainable, and just food system in Edmonton. As the GFB project focused more on scaling-up rather than scaling-out, some of the horizontal linkages that supported multiple community capitals were lost. Constraints on funding and the requirement to generate a growth in consumer numbers and sales to offset investments in the physical food system infrastructure resulted in limited commitment and capacity to draw on these social infrastructure investments that relied in particular on the interconnections between natural, social, political, and cultural capital.

Conclusion

The case studies discussed above illustrate the critical importance of paying attention to the social infrastructure of LFIs and also the challenge of doing so while in competition with the mainstream food system where price, efficiency, and convenience rule. Social infrastructure provides opportunities to navigate from short term and pragmatic to long term and transformational objectives. While neither of these cases exemplifies food system transformation, they do provide insights about the challenges, tensions, contradictions, and complexity of transitioning towards sustainability. They highlight the important role that social infrastructure plays in providing opportunities for LFI proponents to be reflective about their practice.

Efforts to scale up can result in being too radical and too risky. Often, the safer bet is to move towards the "low-hanging fruit" and a more incremental approach. Yet as Delind (2011) warns, this approach risks taking attention away from the values and goals of equity, citizenship, place-making, and sustainability that drive many LFI stakeholders and can actually be used to support the status quo. Social infrastructure investments are needed to support radical and strategic incremental changes that can serve as levers and catalysts for broader change. These investments can only be identified by developing and maintaining the horizontal and vertical linkages to manage and balance the risks of building an alternative to the status quo.

Social infrastructure is equally important in maintaining a focus on the "politics of reflexive localization" (Levkoe, 2011, p. 688). The case studies discussed here highlight that social infrastructure is critical to assess what is being scaled-up and why. A reflexive approach to scaling-up ensures that LFIs are not making investments in food system infrastructure simply for the sake of scaling-up and that questions about how the food system operates and how benefits and costs are distributed are addressed. In the context of food system transformation, LFIs require an orientation towards social and environmental justice that will be challenging and risky to implement. Social infrastructure investments are critical for building support and paying attention to opportunities to scale out, which is equally as important as scaling up.

The cases discussed here can be viewed as alternatives to the mainstream food system at present. As Gibson-Graham (2006) discuss, the fact that they exist offer hope that change is possible. The development of horizontal linkages between LFIs embedded in particular places and other social movements committed to social and environmental justice offer opportunities to build collective social infrastructure, which can "potentially realign production-consumption chains and capture local and regional ecological and economic value both within and between rural and urban spaces" (Marsden, 2010, p. 227). Investments in social infrastructure provide the basis for dealing with the complex and messy process of change by focusing not just on the immediate short-term solutions, but on the process of empowering citizens for the long term (Flora & Flora, 1993). Reframing the risks associated with scaling up their impacts can generate innovative solutions to breaking down boundaries around what is possible. Social infrastructure for LFIs can enable what Gibson-Graham

(2006) suggest is required to reframe problems, reread already existing solutions, and to creatively generate new possibilities where they did not exist before.

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Original Research Article

Cultivating community through gardening in Kenora, Ontario

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Abstract

Community gardens are places where people connect, share, and engage their social and ecological communities. The purpose of this research was to document and communicate participants' experiences of community-building through community gardening in Kenora, Ontario, Canada. The primary method used was Photovoice, whereby a group of twelve participants shared photos and stories of their garden communities in a series of workshops. Follow-up interviews were used to get participant feedback on the Photovoice process and fill gaps in the data, while participant observation was used to triangulate data. Results suggest a uniquely relational perspective of community gardening, the significance of sharing and learning in the garden, and success with and barriers to social capital and ecological citizenship among gardeners. Of particular importance, future garden initiatives in Kenora will likely require a combination of institutional and grassroots efforts to facilitate intergenerational bonding, connecting across community gardens, building gardens in accessible locations, and addressing colonial and racial barriers to collaboration.

Keywords: community gardens, social capital, ecological citizenship, community-based participatory research, Photovoice, Northwestern Ontario

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Introduction

While community gardens vary in size, allocation of space, governance, and availability of resources, they are broadly described as areas marked by some degree of democratic process, where diverse people come together to grow food and other plants (Draper & Freedman, 2010). They also generally consist of individual and/or communal growing plots within a commonly maintained area (Drake & Lawson, 2015).

Among their many potential benefits, community gardens can promote social connectedness and cohesion (Armstrong, 2000; Hanna & Oh, 2000; Saldivar-Tanaka & Krasny, 2004), positive cross-cultural interactions (Shinew, Glover & Parry, 2004; Wakefield et al., 2007), the (re)production and dissemination of ecological knowledge (Andersson, Barthel & Ahrné, 2007; Hale et al., 2011; Okvat & Zautra, 2011), inclusive decision making (Glover, Shinew & Parry, 2005), neighbourhood advocacy, and civic action (Hancock, 2001; Krasny & Tidball, 2009b; Okvat & Zautra, 2011). As well, they can both facilitate and depend upon the flow of knowledge and resources among individual gardeners, garden networks, and the community at large (Firth, Maye & Pearson, 2011; Glover, Parry & Shinew, 2005). Research shows they can provide platforms for individuals to discover and advocate for larger social and ecological communities (Krasny & Tidball, 2009b), and create landscapes through which environmental perception and civic roles are transformed (Baker, 2004; Travaline & Hunold, 2010). In short, community gardens can be places where people connect, share, learn, and engage with their social and ecological communities.

The purpose of this community-based participatory research was to explore local experiences of community building through community gardening in Kenora, Ontario, Canada. Specifically, we examined whether and how community gardening contributed to the production of *social capital* and *ecological citizenship*.

Community building has been defined as "neighbors learning to rely on each other, working together on concrete tasks that take advantage of new self-awareness of their collective and individual assets, and, in the process, creating human, family, and social capital that provides a new base for a more promising future" (G. T. Kingsley, McNeely & Gibson, 1997). Social capital is a well-researched topic in both the community building and community gardening literatures. However, empirical studies of social capital among community gardeners tend to be quantitative and lack rich accounts of context. Furthermore, at its conceptual base, social capital, and much of the community-building literature, frames community in terms of what Block (2008) refers to as "relatedness" among "human systems", leaving room for envisioning more holistic and ecological interpretations of the relationships that make up a community. Ecological citizenship is a highly promising framework for addressing these shortfalls in the community-building literature and conceptualizations of community in general.

Community building through gardening

Community gardens and social capital

Social capital, or the trustworthy and reciprocal connections between individuals in social networks, is an integral component of robust communities (Manzo & Perkins, 2006; Putnam, 2000). Communities with high levels of social capital tend to foster mutual assistance, social cohesion, sense of place, and community identity by maintaining informal networks of people with shared interests, identities, or place-based aspirations (Firth et al., 2011; Manzo & Perkins, 2006). Although social capital remains a contested term (Manzo & Perkins, 2006; Walsh, 2011), Putnam (2000) and Woolcock (2001) agree on two types of social capital: "bonding" and "bridging" social capital. These, along with "linking" social capital are central when considering communities of interest such as community gardens, as well as the social capital they retain. (See Table 1 in *Analysis* for the types of social capital examined in this study and the indicators used to identify them.)

Bonding social capital refers to trust and reciprocity between individuals who share strong social ties, such as culture, kinship, socioeconomic status, or neighbourhood affiliation. Through these ties, community members exchange resources, knowledge and skills, maintain a sense of community, and reaffirm their membership in it. Community gardens facilitate bonding social capital by providing opportunities for families and close friends to share the experience and enjoyment of gardening (J. Y. Kingsley & Townsend, 2006), sustain cultural ties and preserve related ecological knowledge (Saldivar-Tanaka & Krasny, 2004), receive trusted moral support in challenging times (J. Y. Kingsley & Townsend, 2006), and celebrate shared success (Firth et al., 2011; Saldivar-Tanaka & Krasny, 2004).

Bridging social capital describes the reciprocal and trustworthy relationships that develop between individuals of differing socio-economic experience. These relationships facilitate the flow of resources and knowledge between diverse groups with a common interest (Firth et al., 2011; Manzo & Perkins, 2006; Putnam, 2000). Bridging social capital emerges when individual gardeners or gardening groups, despite dissimilarities in class, culture, (dis)ability, or location, build relationships based on a mutual interest in gardening and its shared benefits (Firth et al., 2011; Glover et al., 2005; J. Y. Kingsley & Townsend, 2006).

Linking social capital refers to one's capacity to leverage decision-makers, knowledge-keepers, or resource-holders. Through such linkages, community members are able to gain access to resources and have impact on decisions that have bearing on their lives and well-being (Firth et al., 2011; Woolcock, 2001). Community gardens can bring together community groups, non-profit organizations, government agencies, and educational institutions (Krasny & Tidball, 2009a; Richardson, 2011) around building strong social and ecological communities, often relying on government, corporate, or organizational support through financing, in-kind

assistance, or policy reform (Firth et al., 2011). Those with decision-making power, knowledge, or resources gain social credit in exchange for their support (Firth et al., 2011).

It should be noted that the strong and intimate connections that constitute bonding social capital can also result in the exclusion of those who do not identify with the in-group (Firth et al., 2011; Glover, 2004; J. Y. Kingsley & Townsend, 2006; Shinew et al., 2004). Furthermore, how one understands and gains access to social capital is mediated by social position and ethnic identity, with marginalized community gardeners having generally less access to social networks and resources than their more privileged counterparts (Walsh, 2011).

Community gardens and ecological citizenship

Ecological citizenship, or the integration of social and environmental values through ecological practices like community gardening, is an essential aspect of building broad and robust communities (Krasny & Tidball, 2009a). Rather than framing urban landscapes as built environments inhabited by largely disconnected populations (Light, 2003), ecological citizenship compels us to think of our human environments—urban or otherwise—in terms of relationships among and between people, other species, and the earth itself (Okvat & Zautra, 2011). This holistic view of community blurs the line between society and environment, and can result in people acting together in new ways towards social and environmental community-building goals (Armstrong, 2000; Ohmer et al., 2009; Richardson, 2011; Travaline & Hunold, 2010). See Table 2 in *Analysis* for the aspects of ecological citizenship examined in this study (described below) and the indicators used to identify them.

Ecological citizenship frames social-ecological knowledge and skills, such as those developed through community gardening, as the basis for building socially and ecologically robust communities. Community gardeners learn about the plants, insects, practical gardening techniques, local vegetation, climate, ecosystem services, and the best crops to grow under these conditions (Baker, 2004; Krasny & Tidball, 2009a; Shava et al., 2010). They also learn about each other, cultural practices, food preferences (Wakefield et al., 2007), and social-ecological issues such as food insecurity in their communities (Armstrong, 2000; Richardson, 2011). Furthermore, community gardeners often develop capacities for organizing, advocacy, decision making, and governance (Baker, 2004; Hancock, 2001; Krasny & Tidball, 2009b; Wakefield et al., 2007), as well as the self-confidence to apply these capacities to further community-building activities (Ohmer et al., 2009; Travaline & Hunold, 2010).

This knowledge and skill-building is reproduced through imitation, communication, sharing, and collective ritual in the physical space of the garden (Barthel, Folke & Colding, 2010) and other public and private spaces, such as community kitchens, where community gardeners convene (Glover et al., 2005; Mundel & Chapman, 2010). Community gardeners thus participate in communities of practice, through which action and the reification of social-ecological knowledge, skills, capacities and related action can result in positive community

outcomes, such as improved ecosystem services, positive social outcomes, and enhanced community well-being (Barthel et al., 2010; Krasny & Tidball, 2009a).

Of particular importance to this research, community gardens can provide opportunities for people to develop ecological citizenship in common with gardeners from different regions or cultures. Individuals who migrate from rural to urban settings, or across regional or national boundaries, often maintain culturally diverse, experiential, or practical agricultural knowledge that can be applied to new gardening contexts (Krasny & Tidball, 2009a; Shava et al., 2010). By sharing food and knowledge across cultural boundaries, community gardeners are introduced to new foods and cooking techniques (Hancock, 2001; Travaline & Hunold, 2010; Wakefield et al., 2007) and set the stage for the production of further social capital, learning, cross-cultural cohesion, and community building (Richardson, 2011; Saldivar-Tanaka & Krasny, 2004).

Research design

Context

Kenora is a city of nearly 16,000 full-time residents (City of Kenora, 2014), located in Northwestern Ontario, near the Manitoba border. Kenora has long been known for its pristine lakes and cottage life; during the summer, its population more than doubles as part-time residents take up residence in cottage country. Surrounded by several First Nations in Treaty #3 territory, Kenora is also home to many Indigenous people who live in the city, either part of the year or year-round. With a diverse and fluctuating population, Kenora hosts a vibrant food community that includes urban farmers, market vendors, and community gardens (Moquin, 2014).

The majority of community gardens in Kenora are operated by community organizations on private lands. These gardens are designed to promote skills, capacity, community and inclusion specifically among the people they serve. Examples include the community gardens operated by Kenora Association for Community Living, Women's Place Kenora, Changes Recovery Homes, and Waasegiizhig Nanaandawe'Iyewigamig Health Access Centre. Other examples of community gardening are found on private property throughout Kenora, such as at Gardner House and Benidickson Court seniors' apartments. Although the City of Kenora's official plan refers to promoting and identifying municipal cites for community gardening, Rabbit Lake Community Garden remains the only community garden located on municipal land and managed by participating gardeners (City of Kenora, 2015; Moquin, 2014).

This study was done under the auspices of the Common Ground Research Forum, a five-year community-university research alliance supported by the Social Sciences and Humanities Research Council of Canada. The alliance partners were the City of Kenora, Grand Council of Treaty #3, three Anishinaabe First Nations (Obashkaandagaang, Ochiichagwe'babigo'ining, Wauzhushk Onigum) and two universities (Manitoba and Winnipeg). The goals of the alliance

were to understand and build capacity for collaboration and social learning across Indigenous and settler populations, recognizing that Indigenous people have historically been excluded from resource management and agricultural opportunities afforded to settlers in the region (Davidson-Hunt, 2003; Waisberg & Holzkamm, 1993). The activities of the alliance included issuing calls for community-based research proposals, and working with those involved to develop and implement their proposals.

Our study stems from this process, and is founded on a three-year research relationship we established with the Arts Hub (the Hub)[1]. Operated by the Kenora Association for Community Living (KACL), the Hub promotes valued social roles for people with disabilities, and helps build inclusive community through arts-based programming and community events (Kenora Association for Community Living, 2008; 2014). In 2010, the Hub added container gardening to its suite of activities, and has since worked to expand its garden programming and networks. In 2012, it built an accessible garden (with raised beds and paved aisles) and subsequently hosted an annual series of garden workshops. In late 2012, we began discussions with Hub management and staff about partnering on a community-based participatory research project to investigate the contributions of community gardening to community building in Kenora.

Photovoice

We chose P*hotovoice* as the primary data collection and analysis technique because it includes community members in data collection, analysis, and dissemination, and promotes community ownership of knowledge and outcomes. It also matched the Hub's interest in action research and complemented its arts-based mandate for community building (personal communication with Lisa Gate-Villa, KACL Manager 2012).

Photovoice is an innovative and participatory approach to research whereby a group of community participants use photography, stories, and public art to identify and engage community strengths and areas for actionable change (Palibroda et al., 2009; Wang & Burris, 1997). Photovoice participants are, therefore, repositioned as co-researchers. They guide the identification of themes and subjects that are photographed, produce and collect data by taking pictures of relevant phenomena in their environment, and discuss these as a group. They then analyze the data in partnership with the lead researcher, and actively participate in dissemination of findings through public exhibition and community engagement (Wang & Burris, 1997). Through this participatory process, Photovoice participants create and communicate knowledge on issues of particular interest to themselves and their fellow community members. Photovoice participants can facilitate social change by exposing a broader range of actors, including policy- and decision-makers, to the valuable knowledge and insightful experiences of participant-

[1] http://www.kacl.ca/index.php/ojb/departments/options-for-adults/community-participation-and-support/arts-hub.

researchers (Castleden, Garvin & Huu-ay-aht First Nation, 2008; Nykiforuk, Vallianatos & Nieuwendyk, 2011; Wang & Burris, 1997; Wang & Redwood-Jones, 2001).

Participants and process

Rather than purposeful sampling for Photovoice, Palibroda et al. (2009) recommend using a variety of formal and informal methods to recruit participants who are passionate about the research topic, diverse in experience, and ready to work for long-term change. With this approach, the lead researcher is responsible for ensuring that participants are aware of the commitment involved, consent to the project goals, and understand their responsibility for the direction of the project.

The principal investigator and Hub personnel administered the Photovoice process. We initially distributed electronic and hard copies of an invitation to Hub patrons who were known to garden at the Hub or elsewhere. However, to promote the Hub's goals of being an inclusive community and building ongoing collaborative partnerships between community gardens and gardening organizations, we forwarded invitations to community gardeners throughout Kenora.

The final group of 12 participants included people from four community gardens managed by local organizations, a combination of Indigenous and settler gardeners, and individuals with diverse intellectual abilities and experience with gardening and photography. Although slightly larger than the seven to ten participants recommended by Palibroda et al. (2009), the group of 12 offered a diversity of perspectives, as well as opportunities to collaborate with various organizations and gardeners throughout Kenora.

Photovoice participants attended an orientation meeting to document their informed consent, receive their cameras[2], participate in a photography workshop, and obtain the first of four photography assignments that they would complete over the next four weeks. Assignments for weeks two, three, and four were decided by the Photovoice group. The assignments were as follows:

> 1) My Garden Community. The first assignment was designed to let participants explore elements of their garden community that are meaningful to them.
>
> 2) Relationships. For their second assignment, participants chose to explore the social and ecological relationships that make up their garden communities.
>
> 3) Other People's Gardens. Participants photographed other people's gardens as a way to highlight community assets and discover new sources of ideas and knowledge.

[2] Digital cameras were given to all participants as compensation for participation. Meals were served at each meeting. Transportation by taxi and child-minding were available at no cost.

> 4) Sharing Our Potential: Sharing and potential were common themes in the first three workshops. In the final week, participants investigated both themes in greater detail.

The Photovoice group met for weekly workshops at the Hub, at which they shared their photos and stories and engaged in a facilitated discussion on the weekly assignment theme. Participants were not expected to attend every workshop, and attendance ranged from six to nine participants at each workshop. Discussions involved identifying key narratives that emerged from the photos and accompanying stories. The Photovoice workshops were audio recorded and transcribed, and the transcripts given to participants for verification.

After all assignments were completed, photographs and key narratives were compiled into a public exhibit so that the group could communicate to the public what they had learned. The exhibit, titled "Growing together: Cultivating community through gardening," included 38 photographs and accompanying stories from eight of the participants (all 12 participants were given the option to add their photographs). To help achieve knowledge mobilization, the exhibit was launched at an open house at the Hub, in September 2013, where it was covered by local media. The following week, it was prominently featured at the Matiowski Farmers' Market, and was later installed for a year at the Kenora Recreation Centre. The exhibit returned to the Hub in August 2014. Throughout its year-long travels, the exhibit generated positive responses from viewers. As one participant pointed out in her interview with Kenora Online, "I think people are really impressed. When you see the pictures blown up, you just see how much beauty there is there and how people interpret the different concepts of gardening. So far I'd say the response has been very positive" (Judy Underwood quoted in Harris, 2013).

Supplementary methods

Participant observation and follow-up interviews were used to fact-check data and triangulate findings that emerged from the Photovoice component of the research. Participant observation included participation in and observation of garden maintenance (i.e., sowing, weeding, watering, harvesting) and garden-related celebrations (i.e., community feasts and harvest celebrations). Semi-structured follow-up interviews were conducted with participants to get feedback on the suitability of Photovoice for this research and what participants liked best and least about it, as well as to elicit further data on research themes not covered, or of emerging interest, in the workshop setting.

Specifically, participants were asked about connections to decision-makers and people with resources (linking social capital), social exclusion in gardening groups, skill development through gardening, and successes in and opportunities for cross-cultural collaboration. Of the 12 participants, six provided follow-up interviews, one participant declined an interview (and did

not give a reason), and five did not respond to our request. As with Photovoice workshops, interviews were audio recorded and transcribed, and the transcripts given to participants for verification.

Analysis

If academic concepts such as social capital, which are often unfamiliar to community gardeners and research participants, are to be useful, they must be firmly situated in local context and responsive to ethno-cultural and socio-economic differences (Walsh, 2011). As such, the verified workshop transcripts were coded according to ideas and terms that emerged during workshop discussions. Relying on grounded theory techniques (Corbin & Strauss, 2014), coded data were then grouped into major themes that corresponded to the Photovoice assignments. The themes were synthesized into a plain language community report that was given to participants for verification. Five participants provided feedback on the report during follow-up interviews and three did so by email. Interview transcripts and observation notes were later coded according to the same framework as the Photovoice data and integrated into the results. This analysis resulted in a set of locally contextualized results, previously published in Moquin (2014).

Table 1: Analytical framework for social capital

Type	Description	Indicators
Social Bonding	Trust and reciprocity among existing social groups (J. Y. Kingsley & Townsend, 2006; Putnam, 2000)	● Reciprocity among family and friends ● Trust among family and friends ● Bonding opportunities
Social Bridging	Trust and reciprocity among diverse people with a common interest (J. Y. Kingsley & Townsend, 2006; Putnam, 2000).	● Reciprocity among diverse gardeners ● Trust among diverse gardeners ● Bridging opportunities
Social Linking	Access to resources from institutions and decision-makers (Firth et al., 2011; Woolcock, 2001)	● Support from the city ● Support from business ● Support from local organizations ● Schools and workplace initiatives ● Linking opportunities
Social Exclusion	Exclusion from strongly bonded groups and lack of access to networks or resources (Glover, 2004; J. Y. Kingsley & Townsend, 2006)	● Exclusion from strongly bonded groups ● Exclusion from networks or resources

These contextualized results were then analyzed according to frameworks for social capital and ecological citizenship, each of which consisted of four major components, several subcomponents, and related indicators. Given the dearth of qualitative research on social capital (J. Y. Kingsley & Townsend, 2006), a framework for analysis was developed specifically for this project (Table 1), based on the literature presented above. The four major categories were: social bonding, social bridging, social linking, and social exclusion. As for ecological citizenship (Table 2), major categories included: social-ecological knowledge, skills, action, and cross-cultural collaboration.

While the frequency of discussion or unanimity of opinion may provide valuable insights into predominant or shared experiences, we acknowledge the noteworthiness of minority, conflicting, or idiosyncratic perspectives (e.g., Miles, Huberman & Saldaña, 2014). That said, notation was made of how many participants spoke about each indicator and, where relevant, these quantities are noted in the results section as follows: one participant, two participants, some participants (three to five), half of participants (six), most participants (seven to eleven), and all participants (twelve).

Participants were given the option to use their real names or pseudonyms for direct quotations. All photography is attributed to participants and is used with their permission.

Table 2: Analytical framework for ecological citizenship

Aspect	Description	Indicators
Social-ecological knowledge	Local knowledge of people, plants, ecosystems for building robust communities (Krasny & Tidball, 2009a; 2009b; Shava et al., 2010; Wakefield et al., 2007)	● Knowledge of people ● Plant knowledge ● Food knowledge ● Animal knowledge ● Local environmental knowledge ● Knowledge opportunities
Skills	Skills and capacities as growers and community organizers developed through community gardening (Baker, 2004; Hancock, 2001; Krasny & Tidball, 2009b; Wakefield et al., 2007).	● Practical gardening skills ● Communicative/organizing skills
Action	Application of skills and capacities towards action on social and ecological issues (Baker, 2004; Hancock, 2001; Krasny & Tidball, 2009b; Wakefield et al., 2007).	● Capacity-building, access to food ● Beautification and urban pride ● Environmental stewardship ● Action opportunities
Cross-cultural collaboration	Introduction to new foods, knowledge, and skills through sharing food and knowledge across cultures (Hancock, 2001; Travaline & Hunold, 2010; Wakefield et al., 2007).	● Cross-cultural collaboration (general) ● Indigenous-settler collaboration ● Cross-cultural opportunities

Results

Setting the context

All participants in this study revealed that, through community gardening, they interacted within a social-ecological system that included the people, plants, animals, and environmental conditions that contribute to the production of food, medicines, and ornamentals in the community. According to participants, these relationships and the sharing, cooperation, and learning that transpired through them were a defining feature of community gardening.

> "I always bring friends up to my garden plot, and talk them into helping me out. And then they get to take some of it home when they go" (Fay, August 1, 2013).

> "[A good friend of mine] has really nice plants and lots of veggies and that stuff, from gardening... We share some veggies together" (Johanna, August 22, 2013).

> "I realized that a little sunflower plant had sprouted from the work of the squirrels and the chipmunks. So at first, I started plucking them out. And then I thought, 'No. That doesn't feel right. I'm just going to let them grow.' And that was sharing" (Judy, August 22, 2013).

> "I used to come out of sweats [and] lay on the grass just like that, and I'm thinking, 'Take care of me. Hug me. You know more than I do.' I wouldn't want to invade this space, because it's beautiful the way it is. Because in that space, there's an ecosystem: there's a whole bunch of insects and all different life forms that are living in that area" (Mother, August 22, 2013).

Community building was fostered through a variety of gardening practices that transpired, not only in conventional community gardens, but also in the natural, private, market, and public gardens that contribute to a robust community gardening landscape. *Conventional community gardens* included the shared spaces where people come to grow plants in individual or communal plots, as described in the introduction. *Natural gardens* included the plants and foods found outside of cultivated garden settings, such as berries, mushrooms, onions, rosehips, and medicines like sage and blueberry.

> "The onions are natural. We've got a lot of berries, too" (Tom, August 22, 2013).

Figure 1: Sharing Success © 2013 by Fay Clark. Gardeners converse about vegetables and weed management.

Figure 2: Rabbit Lake Community Garden © 2013 by Meg Wheatstone. Rabbit Lake Community Garden is the only conventional community garden in Kenora on city land and managed by gardeners.

Gardeners often cooperated, learned, and shared with their families and neighbours in *private gardens*, which participants considered a form of community gardening.

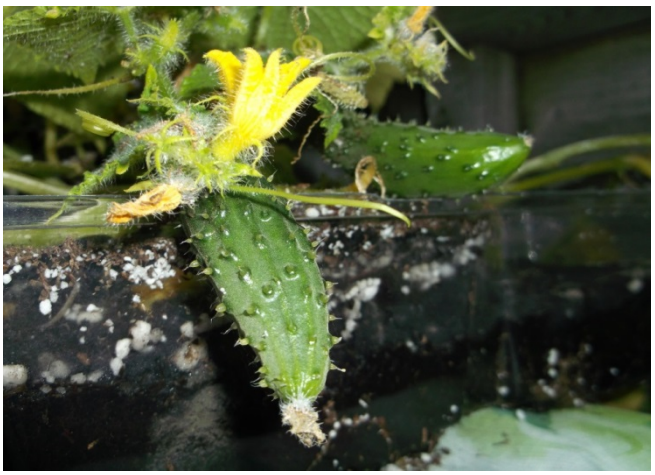

Figure 3: Good Things / Small Containers © 2013 by Judy Underwood. Judy started cucumbers from seed. With too many plants and not enough containers, she traded plants for pots with her neighbour.

> Market gardeners grow and sell their produce locally in *market gardens*, and contribute to a sustainable and innovative community garden landscape. "[One market gardener's] idea is to allow more people to have the experience to grow gardens. And it's not just a raised garden, it is waist high. He has several active gardens right now using that construction, and what he's recycling is the old palettes. So the materials are basically free... And he's thinking, because [if you cannot] bend down...you can continue enjoying gardening, and he's making it possible for them" (Leanne, August 22, 2013).

Although tended by municipal employees, *public gardens* were known to be enjoyed by the public and community and have the potential to produce food.

> "[The McLeod Park gardens are] part of the community, where community members and tourists come to that particular spot to take pictures" (Mercedes, August 15, 2013).

All participants recognized success and growth in their garden communities, and throughout the garden landscape. According to participants, gardens provided places to gather and share; enjoyment for gardeners and visitors; connection to nature and beauty; opportunities for relaxation, personal time, and play; a source of meaning, purpose, pride and accomplishment; increased food skills and capacity; and access to healthful food and physical activities.

> "[The garden provides] access to safe, affordable, culturally appropriate food [and] is a means for people to take control of their own lives... and grow the food that they want to grow" (Judy, August 8, 2013).

> "It's part of a food security program. [They] have fresh produce, and also helping them with skills and increasing their self-reliance and self-esteem" (Mercedes, August 1, 2013).

> "The garden feels good for everybody: because they eat healthy, and [develop] strong bones, and exercise every day" (Johanna, August 15, 2013).

> "It's important to note that we have successes in community gardening, and that it makes our city beautiful. And that it's possible, as well. So, I think that seeing it as a success and possibly building on it is something that we should consider" (Fay, August 22, 2013).

Figure 4: Heads Up! © 2013 by Meg Wheatstone. Among their many benefits, community gardens provide healthful foods like this head of cabbage.

Some participants also saw a need not just for more community gardens, but for gardens located in places that are accessible to those who could most use them. They recognized that existing ornamental garden beds and grassy boulevards in central, high-traffic areas could be used to grow edibles as well, and saw food production on municipal land as a way to bring people together, beautify the city, and improve access to food and gardens.

> A vegetable garden that's central that everybody could get to [would be a good addition] (Fay, August 22, 2013).
>
> [There are many] flowers along the harbourfront... Wouldn't it be great if, amongst the flowers, there [were] some vegetables, and people were free to pick and eat them? (Judy, September 10, 2013).

Figure 5: *Beautiful Potential © 2013 by Judy Underwood.* Flower boxes near the harbourfront could be used to grow vegetables for consumption by restaurants, community groups, and even passers-by.

This section summarizes the degree to which social capital—bonding, bridging, linking, and social exclusion—was evident in participant narratives of community gardening. It also outlines evidence regarding opportunities for enhancing those social capital characteristics (see Table 3).

Table 3: Evidence of social capital through gardening and related activities

Type	Indicators	Summary of Findings
Social Bonding Reciprocity and trust among family and friends	Bonding reciprocity	Shared responsibilities, time, energy, knowledge, produce; satisfaction, fulfilment, self-worth in exchange for efforts
	Bonding trust	Trust in family and friends to provide gardening knowledge or help maintain the garden; dependability
	Bonding opportunities	Intergenerational learning and knowledge; preservation of gardening culture
Social Bridging Reciprocity and trust among diverse people with a common interest in gardening	Bridging reciprocity	Shared responsibilities, time, energy, knowledge, and resources among new gardening acquaintances
	Bridging trust	Trust in others' knowledge; open to conversation; letting others harvest from plots
	Bridging opportunities	Expanding social bridges; developing more urban gardens to build bridges
Social Linking Access to resources from institutions, decision-makers, and people with power	Support from the city	Donation of land for Rabbit Lake Community Garden; public municipal gardens for tourism and beautification
	Support from business	Donation of garden inputs (plants, mulch)
	Support from local organizations	Community gardens governed by a local organization
	Schools and workplace initiatives	Successful and upcoming initiatives in schools and workplaces
	Linking opportunities	Greater support and direct involvement by city and businesses; investment potential of gardens; space, funding, management support; grassroots initiatives may be preferable to formal support
Social Exclusion Social barriers to bonding, bridging, and linking	Exclusion from strongly bonded groups	Exclusion of Indigenous and other racialized groups; hesitance to share knowledge outside of family and close friends
	Exclusion from networks or resources	Transportation

Social bonding

All participants spoke of how community gardening and related activities brought families and friends together. Reciprocity through gardening was evident in the responsibilities, time, energy, knowledge, and produce shared among family and friends. Some gardeners derived a sense of fulfilment or self-worth in exchange for their efforts. Gardeners trusted their family and friends to provide gardening knowledge or help maintain the garden.

> "[My husband] knew everything and taught me... But this year, I had to go on a trip back to Guatemala. So I didn't have time to plant. So he did it this year" (Mercedes, August 1, 2013).

> "I had extra plants, so I shared some with my neighbour next door. I didn't have enough containers, so she gave me some" (Judy, August 1, 2013).

> "Because I'm in a blended family, I thought, 'Well this is going to help my family, it's going to help his family'" (Mother, August 8, 2013).

Figure 6: Family and Friends Working Together in the Garden on a Summer Day © 2013 by Johanna Hendrickson. Johanna's good friend, Terra, has gardened for a long time. They garden and cook together.

Social bridging

Most participants described community gardens as places that bring diverse people together. They talked about meeting and getting to know new people through these activities. As with family and friends, connections with fellow gardeners and new acquaintances provided an opportunity to develop reciprocity and trust in the gardens through shared responsibilities, time, energy, knowledge, and resources. Gardeners demonstrated trust in other gardeners' knowledge

about gardening and food, and indicated this by engaging in conversations, new experiences, or allowing community members access to the garden.

> "Very nice people help the garden grow...help it clean up, help mow the lawn" (Meg, September 10, 2013).
>
> "It's more interesting when you have a lot of people that are involved with gardening... It helps out quite a bit, anyway, for sure" (Tom, August 8, 2013).
>
> "Whenever you pick that sage, you just take the leaf buds and you sprinkle them. You do the same thing with sweet grass... Other people are going to come" (Mother, August 22, 2013).
>
> "The intention of the garden was for sharing, for whoever saw something that they wanted. They were free to take it" (Judy, August 15, 2013).

Social linking

Half of the participants noted the importance of public municipal gardens to tourism and beautification, and that the City of Kenora and local businesses supported community gardens and green spaces to some degree. Access to municipal land for the Rabbit Lake Community Garden and donations of garden inputs by local businesses were two common examples of this support. Furthermore, the majority of the community gardens in Kenora were governed by local community organizations. Opportunities to garden required having linkages with these governing organizations and, in some cases, participating in other programming. Some participants noted the relevance of gardening at schools and workplaces and spoke of successful and upcoming initiatives.

> "[Businesses] have an interest in making Kenora a place that is beautiful, that is self-sustaining... Some people in that particular group are really community-minded, and they really want growth and success in the community" (Participant 1, March 17, 2014).
>
> "The Fellowship Centre, which has a garden; [WNHAC], which has a workplace garden; KACL, which has a community garden; the seniors' blocks and supportive housing, some of them do have garden plots... Valley View: they're doing the outdoor classroom. They want to have a garden component to that" (Judy, January 31, 2014).

Social capital opportunities

Despite the evidence of linking noted above, some participants noted that the city could do more to promote gardening, including creating more gardens and direct involvement of city councillors in community gardening activities. Restaurants, for their part, could promote more gardening by growing their own produce. However, these participants noted the difficulty in getting decision-makers to support these types of initiatives. They thought that gardens may not be seen as a sound business investment by restaurants or the city. And although there were successful workplace gardens in Kenora, participants often spoke of challenges in establishing a garden at their own workplace. These challenges included lack of space or funding and getting decision-makers on board.

> "If you invest in land and growing things, it's a slow process and there are some teachings or preparation. And that would take more of their time, interest, or money. And I don't think that would provide them with a return. So I don't think that's something that is in their priorities" (Participant 1, March 17, 2014).

> "I would love to start [a garden] at our workplace, because there is some space there available. But it's selling people on the idea and figuring out a way to work with the landlord to do that" (Judy, August 15, 2013).

Some participants suggested that grassroots action and existing garden networks may be more effective than top-down planning and policy change since other gardeners are a source of new ideas and knowledge. Some participants knew, or knew of, master gardeners in their community, and most expressed interest in getting connected with other gardeners and sharing what they learn.

> "It's important to also remember other community gardeners who may be well positioned. Getting to know others in the garden may be a great source of knowledge and resources" (Fay, paraphrased, January 17, 2014).

> "[Gardeners at seniors' residences] will have lots of tips and knowledge of how to [garden], if they did it all their lives when they owned a home or when they were living in a particular community" (Mercedes, August 15, 2014).

> "We should kind of map [the community gardens] out, because they're our assets in the community that we can build on" (Judy, August 22, 2013).

Figure 7: Henry the Innovator © 2013 by Leanne Wheatstone. Many participants described learning from fellow gardeners throughout the community, such as Henry, a well-known gardener, educator, and food activist.

As noted above, social bonding was particularly strong among family and friends who gardened together, and most participants spoke eagerly of ideas and aspirations that would enhance bonding capital, such as their future garden plans, and a desire to promote gardening and share gardening knowledge with their families and communities. Intergenerational learning and passing on knowledge and skills to the next generation was considered key to ensuring greater engagement in gardening and preservation of various cultural and gardening practices by most participants.

> "I'm looking forward to teaching this to my kids [and] keep this going... I know they both like planting, and they love bugs and everything" (Nick, August 1, 2013).

> "[We share what] our grandparents told us, our mentors told, our sisters, our mothers... I share with my daughter [and] I would like her to pass those [teachings] on to my grandchildren and my great-grandchildren" (Mother, August 22, 2013).

> "It made me think about how families used to garden, and how they used their space and their land to provide food... And I thought, 'Wow! How we've lost that sense of backyard gardens'" (Judy, August 15, 2013).

Figure 8: Light Gardening? © 2013 by Fay Clark. When they are not busy on the swing, Fay's children and their friend help out in the garden. Fay hopes that they will learn about food and gardening from being around it, just like she did as a child.

Social exclusion

Most participants described gardens as inclusive places that bring diverse community members together through common activities and goals. However, one participant noted that some Indigenous and other racialized people feel excluded from some gardening activities that are dominated by white Euro-Canadian gardeners.

Some participants critiqued the ability of community gardening to break down barriers, noting that strong relationships in the garden may require a pre-existing connection, such as membership in a strongly bonded group. Two participants suggested that transportation may be the most pressing barrier to having access to gardens, networks, and resources. Without access to a vehicle, it was difficult for some potential gardeners to get to a place where they can garden. Lack of suitable transportation impeded gardeners from visiting and sharing with other gardeners, as most of the participants expressed their intentions to do.

> "[The gardeners] are always welcoming and smiling" (Johanna, January 17, 2014).
>
> "There are so many, especially First Nations people in Kenora, who don't feel part of the community. They don't participate in community gardens, because they don't feel like their opinions matter" (Participant 1, March 17, 2014).
>
> "Many of the people in and around Kenora that could benefit from more gardening don't have access to a vehicle. Transportation barriers are often ignored in here, because everyone is thought to have a car" (Fay, paraphrased, January 17, 2014).

Ecological citizenship

This section outlines the degree to which ecological citizenship—knowledge, skills, action, and cross-cultural collaboration—was evident in participant narratives of community gardening. It

also summarizes opportunities for enhanced individual and intergenerational learning, further action on community gardening, and improved cross-cultural collaboration. Opportunities related to skills were not explicitly discussed. Table 4 provides a summary of the indicators and evidence of ecological citizenship and of opportunities for its enhancement.

Table 4: Evidence of ecological citizenship

Component	Indicators	Summary of Findings
Social-ecological knowledge Knowledge of the people, plants, animals, and local environments that make up one's community	Knowledge of people	Knowledge of friends, family, other gardeners; learning about each other
	Plant knowledge	Knowledge of plants, characteristics, services, relationships, health, care
	Food knowledge	Knowledge of food preferences, quality, harvesting; trouble identifying food
	Animal knowledge	Knowledge of animals and insects, services, pests
	Local environmental knowledge	Knowledge of local environment, conditions, regional differences
	Knowledge opportunities	A desire to learn more; pass on knowledge to future generations; culture change
Skills Practical expertise with gardening or acquired through gardening	Practical gardening expertise	Practical skills related to gardening and garden maintenance; food preparation skills
	Communicative and organizing skills	Community engagement and organizing around social-ecological issues
	Skills opportunities	Not explicitly discussed
Action Taking action on social-ecological issues in the community	Positive outcomes of garden-related action	Enhanced capacity and access to food and gardens; urban beautification; environmentally responsible gardening practices
	Action opportunities	Environmental stewardship and culture change; more gardening on the urban landscape
Cross-cultural collaboration People from different cultures cooperating, sharing, or learning together	Cross-cultural collaboration (general)	When cooking and eating in restaurants, with friends, and at community food events
	Indigenous-settler collaboration	Cross-cultural influences on gardening and food; cross-cultural community food events
	Cross-cultural opportunities	Better understanding of others' cultural food practices and preferences; more investment of time, energy, and outreach

Social-ecological knowledge

Participants in this study demonstrated a wealth of social and ecological knowledge, foundational to understanding and addressing issues of community importance, conceiving of community in holistic terms, and being creative in what building community might entail. In addition to knowledge of the other people in their community (see *S*ocial capital, above), all participants demonstrated some knowledge of the local plants, animals, and environmental conditions. Most demonstrated a capacity to identify and manage the plants and food items in and around their gardens, as well as articulate taste and quality.

> "I guess the plants were kind of dusty, like it needed some moisture... I just kind of figured they were thirsty, so we watered them down" (Tom, August 8, 2013).
>
> "You take pride in what you grow. It tastes so much richer" (Mercedes, August 8, 2013).
>
> "If you're not [familiar] with it, you can't pick [mushrooms]. It's not the same as looking in a book, [so] I'm teaching as many people as I can" (Fay, August 22, 2013).

Figure 9: Untitled 2 © 2013 by Jeremy Muckuck. When Jeremy cracked his first pea pod, he was surprised by the space between the peas.

Most participants demonstrated knowledge of their relationships with the animals and insects with which they share the garden. They recognized that some plants and animals provide ecological services, while others may be pests. Regardless, they are all part of the garden community. Most participants noted the importance of local environment conditions. They recognized the value of water, sunlight, and healthy soil for their gardens, as well as how growing conditions are different in different places.

> "The bees on the flower get nectar to make honey, pollinate the flowers... They're pollinating lupines, and making some honey, because it's food for bees" (Meg, August 1, 2013).
>
> "I just hope [the groundhog] doesn't take all our carrots underground. That's alright though. Having little critters come around the garden makes it more interesting" (Tom, August 1, 2013).
>
> "It's a beautiful spot to have a garden. It has westerly exposure, and the lake is right there. So, it's easily watered and the soil must be nice and moist" (Fay, August 15, 2013).
>
> "Water is life: is what sustains us, and is what sustains our gardens... And knowing that you don't put any pesticides and you're not causing more damage to the land, than already has" (Mercedes, August 8, 2013).

Figure 10: Alien *A*mong Us © 2013 by Leanne Wheatstone. Pollinators provide essential services to gardens.

Skills

While not extensively discussed, most participants gave examples of practical skills they learned related to garden preparation, maintenance, harvesting, and food preparation. Generally speaking, most participants recognized community gardening as a great way to develop these skills. Furthermore, two participants learned organizing or advocacy skills through their involvement in community gardening.

> "Many of the women that [garden here] are struggling with food. So it's part of a food security program, and also have fresh produce, and also helping them with skills and increasing their self-reliance and self-esteem" (Mercedes, August 1, 2013).
>
> "It was building that sense of community, of pulling neighbours together that might not, as a whole, collectively have gotten together" (Judy, January 31, 2014).
>
> "I learned community advocacy and using conversation to stress the positive outcomes of community gardening" (Fay, paraphrased, January 17, 2014).

Figure 11: *Family and Friends Working Together in the Garden on a Summer Day 4 © 2013 by Johanna Hendrickson.* Johanna grows flowers and vegetables with her mom, like these tomatoes and pansies. Working with her mother, aunt, and several friends, Johanna has learned an assortment of gardening skills.

Action

Most participants pointed to new and existing institutions, organizations, and people who have taken action, through gardening, to create change in their communities. Many participants noted enhancements in access to food and gardening as a result of recent and positive developments. Some participants identified the role of gardens and gardeners in beautifying the city, and the

importance of celebrating such achievements. Many participants spoke of preserving the natural environment through gardening practices, and caring for the resources used in the garden (e.g., land, soil, water).

> "[This garden promotes] access to safe, affordable, culturally-appropriate food. [It] is a means for people to take control of their own lives, and grow their own food, and grow the food that they want to grow" (Judy, August 8, 2013).

> "He has several active gardens right now using that construction [by which] you can stand and garden. And he's thinking—because people, physically, as they age or for whatever reason they run into an issue that they can't bend down—here's your option. You can continue enjoying gardening. He's making it possible for them" (Leanne, August 22, 2013).

> "I think [the flower baskets] are a community asset and, as far as I can tell, it's going well, because there are several throughout the community. And I think it's important to note that we have successes in community gardening, and that it makes our city beautiful" (Fay, August 22, 2013).

> "Well, if you compost, then that's less material that's going to the landfill, which definitely benefits the environment. My neighbour, who would bag up her leaves that would go in the garbage, now come in my yard. Because I do have a pile where, over the last three years, the leaves have been composting" (Judy, January 31, 2014).

> "[My husband] planted the milkweed to get the monarch butterflies to come. He orchestrated parts of the garden for different reasons" (Leanne, February 1, 2014).

Cross-cultural collaboration

Cross-cultural collaboration through gardening was not discussed much in the workshop setting. Food-based collaboration was largely confined to restaurants, when cooking and eating with friends, and at community food events. Yet when asked specifically about Indigenous-settler collaboration in interviews, all interviewees (half of the participants) were able to identify some examples of cross-cultural influences on gardening and food, as well as several cross-cultural community food events.

> "We don't know where everything comes from, but there are cultural influences all around. For example, Aboriginal peoples gave us smoked fish" (Summary from interview with Fay, January 17, 2014).

> "And we've always picked berries, as a kid growing up. So that's one of their traditions, too, in the [Indigenous] community... And wild rice: we enjoy wild rice" (Leanne, February 1, 2014).

> "There were some workshops held in Kenora, and [an Indigenous elder] came and spoke to us. That was really significant. I think it's a good way for people to start thinking about food in a different way, when you're exposed to food from different cultures... I think of the three sisters gardening and the companion gardening with the corn, squash, and beans, and thinking about how I can incorporate that into my garden" (Judy, January 31, 2014).

Ecological citizenship opportunities

In terms of knowledge and action opportunities, some participants understood local gardening culture to be in jeopardy. Some suggested that a change of culture is what is needed to ensure a better relationship with the environment and resources, and saw opportunities for learning and teaching in the garden, especially across generations. Some participants advocated explicitly for the use of environmentally responsible gardening practices, wherever possible. (See also *Social capital opportunities*, above, for opportunities related to passing on garden-related knowledge to children and developing the urban gardening landscape).

> "It's about changing the culture and the community, and getting people just engaged in whatever ways they can" (Judy, January 31, 2014).

> "I think that the kids in school now are learning a lot about the environment, about recycling, about composting... I think there are opportunities to share more information" (Participant 1, March 17, 2014).

> "There is a lot of water in this area [now], but...what is going to happen when that resource becomes scarce, too? [We should use it] to the maximum, the natural [source] when it rains... gather the water" (Mercedes, August 8, 2013).

Figure 12: *Natural Relationships 3 © 2013 by Mercedes Alarcón.* A lily opens after a rain shower, demonstrating our dependence on water.

In terms of opportunities for cross-cultural collaboration, some participants noted a lack of understanding in regards to the cultural origins and benefits of food plants and practices. Some others were more vocal about racial tensions that exist in Kenora, and their impact on potential collaboration within the community (See also *Social exclusion*, above). Overcoming these obstacles was seen as requiring a greater investment of time and energy. As initiatives tended to draw the same group of concerned individuals, outreach to the wider community was viewed as equally necessary.

> "I would say there's a fair lack of understanding. I mean, I know a lot of people who wouldn't be able to understand why there would be tobacco growing in a vegetable garden: because of it being a sacred gift" (Judy, January 31, 2014).

> "[Because of] racist and discriminatory [attitudes, some people are] missing those opportunities to learn something different... We can create those opportunities, but it's a matter of making the time and investment" (Participant 1, March 17, 2014).

> "Striking conversations among people from various cultures is important. It will also be important to reach out to other people, besides the 'usual suspects'" (Fay, paraphrased, January 17, 2014).

Discussion and conclusions

As noted earlier, community gardens are meant to be inclusive places, marked by some degree of democratic process, where diverse people come together to grow food and other plants (Draper & Freedman, 2010). However, the results presented here suggest a uniquely *relational* view of community gardening, in which individuals interact with a social-ecological community of

people, plants, animals, and environmental conditions that contribute to the availability of food, medicines, and ornamentals. From this perspective, gardening happens and community building can occur whenever and wherever community members gather to grow food and other plants, organize and feast, or simply enjoy locally grown plants and produce. This could take the form of conventional community gardens, public gardens, markets, natural gardens, or private spaces.

Social capital and community gardening

Similar to findings by Walsh (2011, p. 194), the majority of participants were unfamiliar with the term social capital, yet their narratives clearly demonstrated evidence of its occurrence. Participants drew attention to the relational characteristics of community gardens, as well as the role of reciprocity and trust among families, friends, other gardeners, and the community at large. The results show that community gardening in Kenora provided opportunities for family and friends to bond through shared experience and enjoyment. Gardens were also venues for neighbourhood events that helped build community by promoting connectedness and social bridging. Similar results have been documented in a variety of locations, including Toronto (Wakefield et al., 2007), New York City (Saldivar-Tanaka & Krasny, 2004), Melbourne, Australia (J. Y. Kingsley & Townsend, 2006), and Nottingham, UK (Firth et al., 2011). Moreover, not confined to the physical space of the garden, bridging social capital was exercised and community building occurred through enhanced relationships among gardening groups, organizations, and individuals with similar interests (see also Firth et al., 2011).

Intergenerational bonding and cultural preservation through gardening was of particular importance in Kenora. Social bonding was found to be particularly strong among family and friends who garden together, and passing on knowledge and skills to the next generation was considered key to ensuring greater engagement in gardening and preservation of various cultural and gardening practices. This finding parallels results by Saldivar-Tanaka and Krasny (2004) in their research among Latino gardeners in New York. In this and our case, children were not necessarily required to garden, but rather their presence in the garden was seen as sufficient to immerse them in—and therefore preserve—gardening culture and knowledge. Such cultural preservation enhances the potential for future cross-cultural bridging and community building.

Similar to findings by Glover et al. (2005) and J. Y. Kingsley and Townsend (2006), the study demonstrates that community gardening can help bridge the gap between diverse gardening groups. It is clear that there is potential to learn and generate new ideas by getting connected to other gardeners throughout Kenora. This knowledge can then be applied to one's own gardening context, among one's friends and family, or for the betterment of one's community. Participants recognized the diversity of garden types that make up the community garden landscape as a rich source of bridging social capital. In other words, connections can be made and community building can occur in community gardens, but also in private yards, market gardens, public gardens, or common foraging grounds.

Similar to findings by Firth et al. (2011), Richardson (2011), and Krasny and Tidball (2009a), linking social capital was evident in the various relationships between gardening groups and local institutions, such as the City of Kenora, local businesses, community organizations, schools, and workplaces. And while bridging through garden networks may prove more valuable for maintaining a thriving community garden landscape, enhanced supports from local government and business are necessary for identifying and developing more places for community gardens. According to participants, there is a need for not just more community gardens, but gardens that are located in places that are accessible to those who could most use them. Similar to Mikulec et al. (2013), we found that distance, mobility barriers, and/or lack of access to reliable transportation can inhibit potential gardeners who live far from existing community gardens. Overcoming these barriers is important for strengthening gardening's potential as a platform for building community.

Ecological citizenship and community gardening

Participants also recognized that community garden relationships extend beyond the social, and include complex ecological relationships with the plants, animals, and environmental systems that make up, and contribute to, their garden communities. These results illustrate gardening's potential for enabling the development of more holistic and sustainable conceptions and perceptions of community. They also highlight the need and opportunities for fresh views on what constitutes community building. By engaging ecological relationships alongside their social counterparts, and thus practicing ecological citizenship, community gardeners further social-ecological well-being (Okvat & Zautra, 2011) and (re)produce experiential and observational knowledge of their communities and social-ecological impacts (Krasny & Tidball, 2009a).

Consistent with previous studies on the social and ecological aspects of community gardening, this research shows that community gardens provide a place to (re)produce knowledge on the ecological processes that transpire in the garden (Krasny & Tidball, 2009a; 2009b), the connections between gardening and the local environment (Baker, 2004; Shava et al., 2010), and gardening and food preparation techniques (Hancock, 2001; Mundel & Chapman, 2010; Wakefield et al., 2007).

Participants in this research recognized that sharing knowledge in and of the garden can enhance capacities and contribute to healthy environments and ecosystems services (see also Barthel et al., 2010; Hancock, 2001; Krasny & Tidball, 2009b). They understood that community gardens can be a platform from which to develop practical gardening expertise and/or organizational skills, and facilitate positive outcomes for their gardens and social-ecological communities (see also Ohmer et al., 2009; Okvat & Zautra, 2011; Travaline & Hunold, 2010).

Our results, added to research by Baker (2004), Okvat and Zautra (2011), and Saldivar-Tanaka and Krasny (2004), demonstrate the potential for community gardens to expand our notions of community building and to contribute to culturally diverse landscapes that reflect the

preferences and needs of culturally diverse gardeners. Nevertheless, actualization of such outcomes was not evident in the present research study. In fact, while many white Euro-Canadian participants viewed community gardens as bringing diverse community members together through common activities and goals, and providing opportunities for people to feel part of a community, some racialized community members continued to feel excluded from some community gardening initiatives. These challenges to bridging and community building through gardening—the result of colonialism and racism, among other factors—are by no means unique to Kenora, but reveal the potential of community gardening to reinforce social divisions through the exclusion of those not in the gardening or cultural in-group (Firth et al., 2011; Glover, 2004; J. Y. Kingsley & Townsend, 2006; Shinew et al., 2004). There is much work to overcome these obstacles, but participants generally felt that better understanding of others' cultural food practices and preferences as well as greater investment of time and energy into outreach by white Euro-Canadian gardeners to Indigenous and racialized newcomer gardeners were integral to bridging these gaps. Workshops and other shared gardening and food experiences that intentionally seek to facilitate cross-cultural collaboration and include diverse participation were more effective at bridging than simply sharing community garden space.

Concluding comments

Through community gardening and related activities, participants demonstrated an ability to develop and maintain strong social and ecological relationships and in doing so helped build their communities. Social bonding among family and friends through gardening was commonly cited, and is particularly important for passing on gardening knowledge. This is important considering the loss, over the past several decades, of a general gardening culture in Canadian cities. Social bridging with other gardeners happens in some cases, and remains a clear priority for many participants. As ecological citizens, gardeners understand the social and ecological aspects of their communities, and many possess a wealth of knowledge and skills for broadening and diversifying conventional conceptions of community and familiar approaches to building community. Additionally, through their actions, community gardeners enhance access to food, build community capacity, care for their environments, and manage natural resources.

Furthermore, this research demonstrates that there are challenges to community building through community gardening in Kenora. According to participants, transportation, the location of gardens, insufficient municipal and institutional support, and systemic barriers to social inclusion are among the challenges confronting community gardeners. While they may not agree or have all of the answers, the participants in this research provided valuable information as to why these challenges exist and how they may be overcome. According to their diverse insights, it will likely require a combination of institutional and grass-roots efforts to expand community gardening in Kenora, make gardens more accessible, and address colonial and racial barriers to connecting and collaborating.

That said, the insights provided by the participants in this research offer valuable advice for developing the community gardening landscape, planning future garden programming in Kenora, and continuing to build community. Their participation in the research demonstrates the unique and varied forms that community garden action can take. As an extension of their gardening activities, participants used Photovoice to not only describe, but also shape their garden communities, and perhaps inspire others to do the same.

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Original Research Article

Heroes for the helpless: A critical discourse analysis of Canadian national print media's coverage of the food insecurity crisis in Nunavut

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Abstract

In northern Canada, the Inuit's transition from a culturally traditional to a Western diet has been accompanied by chronic poverty and provoked high levels of food insecurity, resulting in numerous negative health outcomes. This study examines national coverage of Nunavut food insecurity as presented in two of Canada's most widely read newspapers: *The Globe and Mail* (*GM*) and the *National Post* (*NP*). A critical discourse analysis (CDA) was employed to analyze 24 articles, 19 from *GM* and 5 from *NP*. Analysis suggests national print media propagates the Inuit's position as The Other by selectively reporting on social issues such as hunger, poverty, and income. Terms such as "Northerners" and "Southerners" are frequently used to categorically separate Nunavut from the rest of Canada and Inuit-driven efforts to resolve their own issues are widely ignored. This effectively portrays the Inuit as helpless and the territory as a failure, and allows Canadians to maintain colonialist views of Inuit inferiority and erroneously assume Federal initiatives effectively address Northern food insecurity.

Keywords: food insecurity; Nunavut; Inuit; Canadian media; critical discourse analysis

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Introduction

With rates of household food insecurity at 36.4 percent (Tarasuk, Mitchell & Dachner, 2013)—three times the national average—groceries that cost twice as much on average as in the South (CBC News, 2015), and a failing federal food subsidy program (Burnett, Skinner & LeBlanc, 2015; Galloway, 2014), lack of access to food in Nunavut has reached crisis proportions. The high cost of groceries in Nunavut has become a contentious issue, and is the focus of various media stories and internet and social media advocacy campaigns (e.g., www.feedingnunavut.com and the *Feeding My Family* Facebook page). Inuit living in the Canadian Arctic have the dubious distinction of having the highest documented rate of food insecurity among any Indigenous group in a developed country (Council of Canadian Academies, 2014). The current crisis featured prominently in the Territory during the recent federal election campaign in the fall of 2015.

Alarmingly high rates of food insecurity among the Inuit in Nunavut are consequences of high rates of poverty and of the transition from a hunter-gatherer traditional diet to a market-based diet, a well-documented phenomenon known as the nutrition transition (Egeland, Johnson-Down, Cao, Sheikh & Weiler, 2011; Huet, Rosol & Egeland, 2012; Kuhnlein, Receveur, Soueida & Egeland, 2004; Schaefer et al., 2011). These radical sociocultural changes are direct results of colonialism and prolonged contact between Europeans and the Inuit (Said, 1994; Smith, 1999). Like other Indigenous peoples in Canada (Daschuk, 2013), the Inuit have suffered massive disruptions, dislocations, and losses under colonialism, including land, language, culture, systems of government, foodways, systems of kinship, and much more (Creery, 1993). The formation of the new territory of Nunavut on April 1, 1999 held the promise of a new era in Inuit self-government. With a population that is 85 percent Inuit, a democratically elected government would ostensibly ensure that Inuit principles, values, and traditions be embedded within the newly created governing structures, providing hope for real change. However, despite the explicit commitment to Inuit traditions, the logic of white, Southern settler society continues to permeate the governance and practices of the Territory (Tedford, forthcoming) and the legacies of colonialism persist in blatant and covert ways.

One of the less obvious ways that colonial discourse is reproduced and perpetuated is in the media. As Cronlund Anderson and Robertson (2011) state, "with respect to Aboriginal peoples, the colonial imaginary has thrived, even dominated, and continues to do so in mainstream English-language newspapers" (p. 3). In this paper, we present the results of a critical discourse analysis of media reports of the Nunavut food insecurity crisis in two national Canadian newspapers, *GM* and *NP*, over a 14-year period between April 1, 1999 and September 1, 2013. Our analysis confirms Cronlund Anderson and Robertson's thesis that "colonialism has remained intact in the press" (p. 276). The coverage of the Nunavut food insecurity crisis in these two national newspapers during this time period overwhelmingly presented the Inuit as "helpless," in need of rescue by the Canadian government. Media depictions of Inuit as complacent to their own plight enables Southern readers to distance themselves, setting up a

cycle of neoracist Othering of the Inuit and racial apathy in the Southern settler society that maintains a colonial dichotomy of the white colonizer as superior and the colonized Inuit as inferior.

Theoretical framework: Settler colonialism and Canadian media

In the following section, we outline some of the methods used by European settlers in the Canadian Arctic to erode Inuit culture. Following this, we provide a brief outline of how such settler colonial processes have become embedded in Canadian national media, reproducing and reinforcing racist attitudes.

Settler colonialism in the Canadian Arctic

The Inuit have experienced significant cultural changes since initial contact with European settlers and explorers in the 17th century, changes that accelerated in the mid-20th century (Bonesteel, 2006) and formed the basis for the current state of Inuit health inequities. Europeans used political, economic, and cultural imperialist tactics to swiftly establish a cultural hierarchy (Bonesteel, 2006; Said, 1994; Smith, 1999), solidifying the Inuit's position as the inferior Other. The Arctic has remained hierarchized because of implicit settler colonial processes that permeate political and cultural relations (Veracini, 2011a) and underpin modern policy development (Warburton, 2007). Unlike colonialism's aim to maintain separation between indigenous and settler populations (Said, 1994), settler colonialism focuses on the structural elimination of indigenous populations through assimilation into European culture (Wolfe, 2006). Ultimately, settler colonialism will "tame" a variety of wildernesses, end up establishing independent nations, effectively repress, co-opt, and extinguish indigenous alterities, and productively manage ethnic diversity... [It] covers its tracks and operates towards self-suppression" (Veracini, 2011, p. 3). As in other imperial settler colonial conquests (Said, 1994), the establishment of permanent European settlements in the Canadian Arctic was paramount for imperial European governments to guide settler colonialist practices and consequent cultural subjugation of the Inuit. Frequent imposition of a perceived white superiority resulted in Inuit geographical displacement, unequal power dynamics between Inuit and settlers, and the solidification of a settler-controlled cultural divide that enabled the Europeans to dictate most economic partnerships (Veracini, 2011a).

Economic control allowed the Europeans to divide the Inuit based on selective and disproportionate employment opportunities given to some individuals which further integrated Inuit into European settler culture (Wolfe, 2006). Examples of such employment opportunities include those hired as guides during the whaling and fur trades of the 17th to 19th centuries, or those hired to work on the military camps during the early 20th century (Bonesteel, 2006; Creery,

1993). Despite opportunities to work closely with European markets, the settlers would never see the chosen Inuit as anything more than The Other (Memmi, 2003), while the Inuit not chosen for employment began to distrust those who worked closely with the white settlers (Bonesteel, 2006). Furthermore, economic control was a key component of settler colonialist expansion and structural elimination of Inuit in the Canadian Arctic, as it enabled mercantilism and its focus on individual economic prosperity (Mcdermott, 1999) to supplant the Inuit's traditional culture of sustenance-based trade and intracommunity support (Healey & Meadows, 2007). For the Inuit, this ideological shift was a monumental moment in their nutrition transition from traditional to more market-based diets, as food became tied to Western market participation and the involvement with settler endeavors.

Despite recent claims stating otherwise (Aboriginal Affairs and Northern Development Canada, 2008), such ideologies of Indigenous repression persist in modern Canadian culture and have led to the current state of Inuit affairs (Patel, 2007). Compared to their white settler counterparts, Inuit have worse employment, educational attainment, and income when compared to their white settler counterparts (Wotherspoon, 2007). These inequalities in the social determinants of health lead to higher rates of poverty and subsequent food insecurity, as well as higher rates of disease and premature mortality, and have become institutionalized through the development of a culturally discriminatory and racially apathetic nation (Garner, 2010).

Canadian national media supports a racial apathetic nation

Recent attempts by the Nunavut and Canadian governments to improve dietary behaviors of Nunavummiut[1] have centered on initiatives that improve access to and consumption of market foods, specifically fruits and vegetables, as a way to counteract rising rates of household food insecurity. Consider the following public health initiatives as examples:

- *Canada's Food Guide: First Nations, Inuit and Métis,* which was developed by Health Canada (2007) to educate Canadian Indigenous peoples on healthy market foods that can be used to substitute for traditional foods when they are not available;
- *Healthy Foods North* (Sharma, 2010), which aimed to address high rates of chronic disease by using a labeling system within supermarkets to indicate healthy foods;
- the *Nunavut Food Guide* (Government of Nunavut, 2011), which was redeveloped with community input in an attempt to create culturally relevant educational resources that address knowledge gaps surrounding market food; and
- the *Nunavut Food Security Coalition* (2016), an initiative created and operated by Nunavummiut to promote a diet that combines country, market, and locally produced foods, and promotes the development of skills necessary to prepare healthy meals, the

[1] Citizens of Nunavut.

> implementation of community programs, and the development of policies designed to reduce social inequities in Nunavut.

With the exception of the *Nunavut Food Security Coalition,* these initiatives are manifestations of settler colonial economic and political activities, as each program attempts to help Nunavummiut—particularly the Inuit—survive within a system that has spawned food insecurity and poverty through institutionalized employment and educational inequities. Publicizing such health-promoting programs to the white settler populations in Southern Canada may enable the majority of Canadians to perceive these initiatives as an appropriate and much welcomed means to alleviate the food-insecure Nunavummiut. That is, it allows Southern Canadians to perceive that they and their elected representatives are saving the Inuit out of the goodness of their hearts. As such, these initiatives may create and reinforce cultural discrimination within the Southern population by instilling racial apathy, which is defined as:

> ... socially produced ignorance or *mis-cognition* that allows people to claim they are nice and have good values, while actively dis-engaging or de-racing their lives to make their physical and mental surroundings into white places that at best maintain the status quo of racial inequality, and at worst exacerbate it. (Garner, 2010, p. 140)

Racial apathy naturalizes residential segregation and enables the white-settler society to attribute racial inequalities to location and the Inuit's desire to live with their people in their homeland (Garner, 2010). Thus, racial apathy reinforces Inuit Othering and a "North versus South" mindset by making anger or frustration a natural reaction for Southern Canadians when reports of Inuit protests over high food prices (Weber, 2012) are publicized alongside the health promoting initiatives that are designed to "save" the Inuit. Therefore, the media's role in naturalizing racial apathy must not be overlooked due to their position as information propagators and their integral role in the dissemination of information regarding Nunavut affairs.

The majority of Canadians rely on national media outlets for information regarding Nunavut affairs, effectively granting media outlets the power to determine what views of the Arctic, Nunavut, and the Inuit the populace receives. Historically, print media has been a powerful vehicle to proliferate racial apathy and solidify settler colonial ideologies among Canadian settlers (Cronlund Anderson & Robertson, 2011). Print media was particularly instrumental in ensuring white-settler support for the Canadian government's barbaric actions during the settlement of the Canadian Midwest, including culling the buffalo herd and then withholding food from Indigenous populations to ensure compliance with new Indian Act treaties (Cronlund Anderson & Robertson, 2011; Daschuk, 2013). This exemplifies McCombs and Shaw's (1972) "agenda-setting" theory, which contends public mass media does not necessarily tell people what to think, rather, they influence what people think about by selectively reporting social events. In this manner, journalists can systematically determine what

events are deemed socially important (Hjarvard, 2012), thereby inculcating and reproducing a societal way of thinking based largely on the interests of the media industry (Palmer, 2000).

Since news is a social construction of reality, examining Canadian national media coverage of Nunavut food insecurity can help explain how cultural discrimination has caused racial apathy toward Nunavut health concerns in a "decolonized" Canadian society. We therefore sought to analyze the Canadian national discourse surrounding Nunavut food insecurity as a function of socially constructed and culturally discriminatory ideologies. We conducted a critical discourse analysis to understand Canadian national media's contribution to and maintenance of institutionalized Inuit Othering amidst a racially apathetic settler colonial state.

Methods

For this study we conducted a critical discourse analysis (Wodak & Meyer, 2009) of Canadian national print media's portrayal of Nunavut food insecurity, and the extent to which settler colonialism and cultural discrimination are present in the national discourse. Our approach was informed by a Foucauldian understanding of discourse as a product of social power and dominance (Foucault, 1972) and by the production of media texts as crucial sites of struggle for control over how reality is portrayed (Fairclough, 1995; Schroder, 2012; Wodak & Meyer, 2009). As such, we view discourse as a manifestation of power (van Dijk, 1993) that serves the interests of dominant groups. Our critical discourse analysis of Canadian print media therefore focused on two nationally circulated newspapers that cater to relatively well educated social elite, *GM* and *NP*, due to determine how modern power is used to influence the national discourse around Nunavut food insecurity. Both sources were readily accessible through Factiva, a news-based database available online with articles dating to 1977.

Articles from *GM* and *NP* were selected for analysis following three rounds of inclusion criteria. The first round selected articles based on their publication date, and included articles containing the word "Nunavut" in any context published between April 1, 1999 (the official first date of Nunavut's separation from the Northwest Territories) and September 1, 2013.[2] This primary sample contained 4478 articles, with 2804 from *GM* and 1674 from *NP*, the majority of which were published after 2005. Articles were included in the second round if they contained the following terms in any combination: Nunavut, food, security/insecurity. This criterion yielded 30 unique articles, 19 from *GM* and 11 from *NP*. A supplemental set of search terms was also applied to the primary sample to capture articles that discussed food insecurity in terms of its health outcomes, and included articles if they contained the following terms in any combination: Nunavut, health, nutrition. This supplemental criterion yielded an additional 19

[2] Since the conclusion of this study there have been additional articles published in *GM* and *NP* on the state of Nunavut food insecurity. Such articles level staunch critiques against federally operated programs such as Nutrition North, which is included in this analysis as an effort by the Harper administration to alleviate Northern food insecurity. For examples of such public critiques consult Hill and Fitzgerald (2015), Peritz (2014), and Woo (2014).

articles, 16 from *GM* and 3 from *NP*. The total number of articles included from the secondary inclusion criteria was thus 49 (35 *GM*, 14 *NP*), with no articles appearing under both sets of inclusion criteria.

The final set of inclusion criteria involved providing structural descriptive codes to each article to gather information about the text, including: the set of inclusion criteria under which the article falls; date, headline, author, word count, and section in which it was published; whether there is reference to an existing Nunavut health promotion/policy initiative; and whether individuals were interviewed, and if so, what positions they hold that make them authority figures on the article's subject matter. Any article that did not have an explicit focus on Nunavut was excluded. The resultant study sample included 24 articles (19 *GM*, 5 *NP*), with all but three articles being published between 2007 and 2013. Each of the 24 articles in the study sample was subjected to in-depth thematic analysis. This process involved the first author manually adding descriptive codes to each article, which were then analyzed collaboratively with the second author to create thematic codes. After initial thematic coding, 12 themes emerged. The first author then re-analyzed the descriptive and thematic codes, and in collaboration with the second author the 12 initial themes were condensed into two overarching themes to characterize the sample in its entirety: social inequalities and food insecurity.

Results & thematic analysis

Thematic analysis revealed two overarching themes present in *GM* and *NP* articles that discuss Nunavut food insecurity: social inequalities and Nunavut food insecurity. Both themes appeared to have a common segregationist tone and reinforced a divide not only between Nunavut and Southern Canada, but also more importantly between the Inuit and white settler society. Social inequalities are often presented as population health statistics followed by an iteration of the phrase, "worse than anywhere else in Canada", and such information is rarely supplemented with current public health efforts to address the issue. Food insecurity is discussed in terms of food cost, which may serve to shock Southern Canadians into paying attention to the story. Unfortunately, once a story hooks the reader with statistics and monetary figures, the inconsistent portrayal of the Inuit as either helpless or resourceful creates a vague depiction of their culture, while simultaneously casting white settlers as heroes to the North. The following will present an in-depth textual analysis of the study sample and will outline the aforementioned themes of social inequalities and food insecurity.

Social inequalities

In this sample from *GM* and *NP*, writers relied heavily on statistics to discuss Nunavut's social determinants of health in terms of population demographics, income and education levels,

chronic illness rates, housing issues, and violence and crime rates. As previously stated, statistics can be used to stress the issue's magnitude and allow the audience to make a meaningful evaluation of the content (Randolph & Edmondson, 2005). Nunavut's population was described as being, "80 percent Inuit…" (White, 2011) whose "life expectancy…is 10 years less than the national average" (Picard, 2008). With regards to Inuit income, writers reported: "The median income is below $20,000" (White, 2011); "ITK says half of Inuit adults earn less than $20,000 a year" (Weber, 2012); and, "half of the residents qualify for social assistance" (White, 2010b). Nunavut's educational attainment was described as "abysmal high-school graduation rates" (Stackhouse, 2011); "…dropout rates sit at 75 percent. Those who do graduate receive an education that falls well short of standards in the South. Thanks to an unofficial policy of 'social promotion'…graduates can possess both a high-school diploma and functional illiteracy" (White, 2011).

In Nunavut, "half of the territory's population is under 25, with a birth rate that leads the nation…" (White, 2011), "the rate of teenaged pregnancy is five times greater than the national average" (Wente, 2012), and Arviat, a town on the western shore of Hudson Bay, is "home to Canada's highest birth rate (roughly 35 per 1,000 people, compared to a national average of 10.3), has no permanent doctor, no hospital, no midwife, no public health nurse" (White, 2010a). To accompany Canada's highest birth rate, White (2010a) reports, "The infant mortality rate in Nunavut is the highest in the country, at 15.1 deaths for every 1,000 live births, compared with a national average of 5.1," which means, "an Inuit baby is 3½ times more likely to die before its first birthday than a non-Inuit newborn" (White, 2010a). Andre Picard (2008) reports Nunavut's infant mortality rate as "four times the Canadian average" and claims the discrepancy "is a testament to Canada's shameful neglect of aboriginal peoples."

To compound Canada's highest birth and infant mortality rates, writers reported high morbidity rates for a variety of chronic conditions. According to Patrick White, "Around 40 percent [of Inuit children] report chronic illness" (2010a). Citing a recent study, Jill Mahoney (2001) explains: "Canadian Inuit babies have among the world's highest rate of lung infections…nearly one in two infants under six months of age required hospital admission for respiratory illness on Baffin Island, Nunavut. Of those, 12 percent had to be placed on life support systems." Anna Banerji (in Mahoney, 2001), the cited study's lead author, explained that such hospitalization rates are, "comparable to a rate that you would expect in the developing world, not in Canada," and calculated an Inuit infant's risk of being hospitalized due to a lung infection to be "484 in 1,000 infants, which is significantly higher than the rate for the average general population: about 10 in 1,000" (Mahoney, 2001). Articles indicated that rickets has resurfaced, given that "thirty-one new cases of rickets were discovered in the first five years of Nunavut's creation" (Minogue, 2007). As Minogue (2007) explained, increased incidence rates are linked to the recent nutrition transition:

> …the Inuit got a healthy dose from traditional foods that happen to be rich in vitamin D: the skin of Arctic char; seal liver; the yolks of

> bird and fish eggs; and seal, walrus and whale blubber. But as the Arctic has changed, so have eating habits. While seal and char are still staples in Nunavut's isolated communities, walrus and whale consumption have been in decline for 30 years.

Tuberculosis, preventable with modern remedies, was reported to be on the rise: "Nunavut recorded its 98th case of tuberculosis in 2010, the most logged in the territory's 11-year history… Nunavut's infection rate is now 62 times the national average, adding to the territory's standing as one of the world's worst places for respiratory health" (White, 2010b); and "Nunavut is experiencing its worst TB outbreak in a decade, with at least 100 new active cases last year, a population rate 62 times the Canadian average" (Stackhouse, 2011). Health officials attribute the resurgence of tuberculosis in Nunavut to "abysmal living conditions" (White, 2010b) and "overcrowded houses with poor ventilation" (Stackhouse, 2011), a territorial problem that has been well documented in the national media.

GM and *NP* writers typified Nunavut's housing as dilapidated and overcrowded, often resulting in domestic violence. According to Patrick White, "half of all homes are overcrowded or in serious need of repair" (2010b) and there is "a never-ending shortage of shelter in the area" (White, 2011). In Iqaluit, "Nunavut's bridge to modern Canada, one in five houses is overcrowded and one in 10 families use their living room as a bedroom. Hundreds of homes need major repairs" (White, 2011). As White describes, overcrowding creates problems that compound the aforementioned chronic health concerns. According to a study investigating the human impacts of overcrowding, "one in four [households] brought up anger. About one in five [households] said depression and violence" (White, 2011). Nunavut households are reported to have a "rate of child sex abuse 10 times the national average" (Wente, 2012) and an RCMP officer stationed in Iqaluit believes children are "safer to be on the street than at home" (Shane Pottie in White, 2011). High rates of domestic violence mean that Nunavut ranks amongst Canada's most violent jurisdictions.

Writers often concomitantly discussed Nunavut's territorial crime rate and alcohol abuse problems. For example, "the rates of suicide and murder are also more than 10 times higher than in the south. Thirty percent of people over 12 are heavy drinkers" (Wente, 2012); "…the [suicide] rate for 15- to 24-year old men is 28 times higher than the national one" (Stackhouse, 2011). Additionally, in Nunavut, "the rate of violent crime per capita is seven times what it is in the rest of Canada. The homicide rate is around 1,000 percent of the Canadian average. And the number of crimes reported to the police have more than doubled in the dozen years since the territory was formed" (White, 2011). Patrick White frequently used narratives such as the following to depict scenes of violence: "Someone had plunged his knuckles through the hallway drywall again and again and again, from the kitchen all the way down to the bedrooms. The blood had been washed away, but the tale of murder, outlined in felt-pen evidence markings, swirled beneath Ms. Qaumagiaq's snow boots" (2011). His narratives link Nunavut's violence to

alcohol abuse issues while respectively framing Inuit and police as the archetypical villains and heroes, as in the following excerpt from his article *The trials of Nunavut: Lament for an Arctic nation*:

> Constable Pottie fishtailed around a corner and headed down an alley until his brake lights burst red against the snow. Thirty metres ahead, barely visible at the edge of his high beams, someone in socked feet leaned unsteadily against a house. Constable Pottie drove close, jumped out and drew the nine-millimetre gun from his holster.
>
> Another squad truck charged in from the opposite direction. Two Mounties jumped out, nine-millimetres up. The young man was cornered.
>
> "Get down on the ground!" one of the other officers yelled. "Drop the knife and get down now."
>
> The guy's eyes darted about until three blurry gun barrels came into focus. He couldn't have been more than 15.
>
> He glanced down at his two-inch blade and then at his socks. For a moment, he seemed to think he would test his knife-at-a-gunfight odds, and lunged forward.
>
> The three Mounties raised their guns. In the midst of his lunge, the kid lost his footing, stumbled and, finally, fell, belly against snow. One young Mountie leaned his knee against the man's back. There were convulsions, then vomit – the rage all gone.
>
> The officers took turns comforting him, patting the back of a teenager who had threatened them with a knife moments earlier (White, 2011).

While violence and alcoholism are common in Nunavut, reporting them in this fashion reinforces cultural hierarchies established during colonization. The Mounties are portrayed as dominant protective figures and, therefore, their violence is justifiable. In contrast, Inuit are depicted as submissive and disorganized alcoholics who terrorize the town, making them appear malicious to the reader.

In this section we have highlighted the underlying tone present in *GM* and *NP* news articles that embed Nunavut food insecurity in broader Inuit social issues such as poverty, limited education, or substance abuse. While authors of such articles often rely on statistics to convey an issue's magnitude to the reader, their use of narratives may have more impact in establishing white settlers in Nunavut as "heroes" to an otherwise "helpless" Inuit population. These colonial undertones of white-settler superiority over the Inuit have been present during much of the discourse. However, a subtler settler colonial tone that focuses on the Inuit's failure

to fully integrate into Western culture begins to dominate the discourse in *GM* and *NP* articles that focus explicitly on Nunavut food insecurity.

Food Insecurity

In this article sample from *GM* and *NP,* food insecurity was commonly discussed in terms of household hunger caused by exorbitant food prices. The articles also discussed the role of Northern retailers, the Canadian government, and Nunavummiut in the situation. Paradoxically, despite discussing causes and effects of food insecurity, there were few attempts to define it. However, in one article, Canadian news conglomerate Canwest News Service (2010) cited Grace Egeland's definition of food insecurity as "a shortage of food that is safe, nutritious and meets the requirements for a healthy and active life."

Other articles did not define food insecurity but quantified it: "Among Inuit families with children aged 3 to 5, household food insecurity is 70 percent" (Wente, 2012); "[A report by Nunavut territorial nutritionist Jennifer Wakegijig] found nearly three-quarters of Inuit preschoolers live in food-insecure homes. Half of youths 11 to 15 years old sometimes go to bed hungry. Two-thirds of Inuit parents also told a McGill University survey that they sometimes ran out of food and couldn't afford more" (Weber, 2012); and "seven in 10 preschoolers in Nunavut live in homes where there isn't enough food to eat, with some obliged to skip meals or even go a whole day without food…" (Canwest News Service, 2010).

While other authors did not explicitly describe food insecurity rates and subsequent hunger as the examples above attempted to, they do implicitly outline the severity of the problem by describing widespread hunger throughout the territory. For example: "70 percent of kindergarten pupils go to school hungry; half of the residents qualify for some form of social assistance…" (White, 2010b); and "seven in 10 preschoolers grow up in houses without adequate food" (White, 2011). As a result, Inuit are growing "concerned over widespread hunger in their communities" (Weber, 2012), and as Leesee Papatsie (in Weber, 2012) explains, "every Inuit in Nunavut knows someone in their family or in their community that is hungry that day." The discourse included the intertwined nature of hunger and food insecurity and pointed to food cost as a significant contributor: "The roots of the problem are deep and tangled. Cost is one of them" (Weber, 2012).

Food insecurity's discursive arena was flooded with reports of high food prices from across Nunavut, to stress both the severity and breadth of the situation to Southern Canadians. As Bob Weber (2012) describes it, Northern markets have "food prices that would shock southerners." Nunavut food prices are often compared to those in the south to make the issue relatable for readers in the south: "…in Pond Inlet on the northern tip of Baffin Island [they] sell two-litre jugs of milk for $7.39… When the boats come in, the price of soda pop drops from $3.50 a can to $2—cheap by northern standards and for some, tastier than healthy foods" (Minogue, 2007); "Common foodstuffs often cost twice what they would in a grocery store in a city in southern Canada" (Canwest News Service, 2010); "…[in] Arctic Bay—a standard jug of

cranberry cocktail sells there for $38.99, eight times more than it would in Southern Canada… $28.99 for Cheez Whiz, $27.79 for a tub of margarine, $19.49 for a brick of cheese" (Wingrove, 2011a); "Healthy food is also already far more expensive in the North. A head of lettuce costs $6.75 in Arctic Bay, while a small bag of baby carrots costs $8.89, both about triple the rate paid in major Canadian cities" (Wingrove, 2011a); "The high cost of food is also a problem… Ocean Spray cranberry juice on sale for $38.99, a tub of margarine for $27.79 and a block of cheese for $19.49" (Stackhouse, 2011); "Brought in by plane, the food carried staggering prices—$27.79 for margarine, $8.29 for four tomatoes, $38.99 for Cranberry cocktail juice and $19.49 for Cracker Barrel cheese" (Wingrove, 2011b); "$13 bag of spaghetti, a $29 jar of Cheez Whiz, a $77 bag of breaded chicken and a $38 bottle of cranberry juice…" (Windeyer, 2011); "A head of cabbage for $20. Fifteen bucks for a small bag of apples. A case of ginger ale: $82" (Weber, 2012); and "Heads of cabbage for $28 aren't going to cut it any more" (Paperny, 2012). Writers created perspective for the readers by comparing Northern and Southern Canadian food prices, enabling the readers to develop sympathy for the Inuit's plight. Writers continued to cultivate their readers' responses by describing how the interplay between Northern retailers and federal programming has an impact on Nunavut's food prices. Writers appear to rely on this strategy of engaging their readers' sympathy for the Inuit before discussing the limited, but valiant efforts of the government to subsidize Nunavut's food prices.

In an attempt to rationalize Nunavut's exorbitant food prices, *GM* and *NP* writers highlighted food shipping costs, and how Northern retailers and the federal subsidies such as Food Mail (later re-launched as Nutrition North) can have an impact on in-store prices. As John Stackhouse (2011) explained, shipping costs can account for over half the food costs: "Shipping $200 worth of groceries costs $500." These fees can be avoided when stores enrolled in Food Mail since it "… allowed a long list of eligible foods and hygiene products to be shipped at 80 cents per kilogram. The unsubsidized price is now $13 per kilogram to ship to Arctic Bay…" (Wingrove, 2011a). According The Northern Store, however, "air freight price has gone up sixfold [*sic*] in some cases" (Wingrove, 2011a), which causes fluctuation in prices beyond the store's control. In April 2011, the Canadian government launched Nutrition North—a re-designed Food Mail program focused on healthful foods—in an effort to promote healthful eating. However, *GM* and *NP* writers were skeptical that it would meet Nunavut's needs, and used the program to introduce ideas about federal and corporate blame. For example, Nunavut's food prices were often framed as resulting from a poorly implemented federal initiative: "…the new program would lead to price drops of 5 to 7 percent in healthy foods, significant though likely not enough to offset increases elsewhere" (Wingrove, 2011a); "Ottawa has a new northern food subsidy program, designed to encourage people to eat healthier foods. Why then does a head of lettuce cost $6.75?" (Stackhouse, 2011); "…personal care items, such as diapers, feminine hygiene products, toothpaste and toilet paper, for which the subsidy had been cancelled… subsidizes the air freight for priority items, such as fresh meat, eggs and fruit, by about 90 percent, down to 80 cents per kilogram. The subsidized cost is still double the unsubsidized rate of barge shipping" (Wingrove, 2011b). Furthermore, Nutrition North's

introduction is causing some retailers who had previously been involved with the Food Mail program to "simply stop participating due to excessive cost and administration work" (Wingrove, 2011b), while others "are worried that Nutrition North, which allows retailers to negotiate costs directly with Southern suppliers, will favour larger companies that can negotiate their own lower prices" (Windeyer, 2011). Additionally, a store's participation in Nutrition North does not guarantee food will remain affordable: "…officials with the North West Co. acknowledged the high prices weren't caused by Nutrition North. Instead, they said prices spiked when the Arctic Bay store ran out of items shipped on last year's sealift and had to bring in fresh supplies by air" (Windeyer, 2011). Claims such as the previous statement prompted Health Minister Leona Aglukkaq to defend Nutrition North and support an Inuit call for action against high food prices. By highlighting that Nunavut's food prices remain prohibitively high even after government subsidies are applied to transportation, writers naturalize the issue as a way of life in Nunavut, which allows their readers to begin to shift their sympathetic response to racial apathy (Garner, 2010). As previously described, racial apathy enables Southern Canadians to view the federal government's attempts to provide affordable food to the Inuit as a noble effort to provide for their citizens. This transition from sympathy to racial apathy is promoted by stories that focus on Inuit protests in response to high food prices.

Nunavummiut have recognized a failure in the northern food delivery system and, as *GM* and *NP* reported, have taken to public protests against retailers to effect change: "Faced with a public outcry over recent spikes in the price of food in remote Northern communities, the federal government is blaming retailers and backing off on planned changes to its Northern food subsidy system" (Wingrove, 2011b); "That site [Feed My Family] is now the nucleus of an unprecedented protest across Nunavut… Ms. Papatsie wants Inuit in every community in Nunavut to stand together outside their local grocery store Saturday afternoon. A similar event is being organized in Ottawa" (Weber, 2012). Ms. Aglukkaq was positioned as the Inuit's voice in office and sympathetic to their territory-wide protests. She accused retailers of being responsible for the spike in prices stating, "if retailers planned accordingly on sea lift, we would not be seeing those outrageous prices in our stores" (Wingrove, 2011b). Additionally, "she insisted her government 'listened to northerners' in deciding to delay the new program and 'is committed to bringing fresh, healthy food to northern homes" (Wingrove, 2011b). However, simply providing an opportunity to purchase affordable fresh food does not guarantee its consumption. As Jennifer Wakegijig explains in Weber (2012), "there's just been a whole shift in the food supply for people that are now living in communities. And that shift in food supply didn't necessarily bring with it knowledge about or how to prepare Southern types of food. Even if that cabbage cost $2, there's no guarantee the Inuit mother would buy it".

Embedded within reports of government and corporate efforts to ineffectively alleviate Nunavut food insecurity, writers highlighted territory-wide protests about high food prices as the Inuit's primary approach to solving to the problem. This depicts the Inuit as:

- intellectually inferior—according to the media they cannot create an initiative as 'integrated' as Nutrition North;
- helpless—they must rely on government assistance if they wish to participate in a Canadian market (which they were forced into); and
- ungrateful and rebellious—despite supposed efforts from the Canadian government and retailers to keep food affordable, Inuit were protesting at each organization's doorstep.

The Inuit and Nunavut have, however, taken a multi-faceted approach to alleviating food insecurity through the development of culturally appropriate, nutrition-centric public health initiatives designed to target all aspects of the colonial legacy that contribute to food insecurity.

Nunavut's public health strategy targets all aspects of population health and acknowledges colonialism's lasting impact on the Inuit. For example, to treat early Inuit encounters with tuberculosis, the Canadian government "…snatched one in every seven Inuit from their homes and placed them in southern sanitoriums, where it was thought a combination of rest, good nutrition and good hygiene would cure the illness. Many never returned. Their families rarely found out how they died" (White, 2010b). As a result, "there remains a lot of residual negativity against the health-care system… There was a lot of grief and trauma associated with the disease" (Isaac Sobol, Nunavut Chief Medical Officer, cited in White, 2010b). The colonial legacy could undoubtedly cripple Nunavut's healthcare delivery and public health initiatives, which is what the majority of the media coverage of Nunavut's food insecurity persuades the reader to believe. However, Andre Picard (2008) provides an alternative perspective that seeks to erode such a stance and acknowledge the capabilities of Nunavut and the Inuit to effectively provide for themselves:

> Nunavut's public health goals explicitly acknowledge the important role that poverty, education, and family and community supports play in health. The social problems that plague the territory—alcoholism, sexual abuse, astronomical rates of traumatic injury, babies born with fetal alcohol syndrome and birth defects caused by poor nutrition—all have their roots in the breakdown of social structures, and rebuilding those links is also stressed. Finally, Nunavut's public health goals speak of the "prerequisites for success", including the need to build more public health capacity at the local level and to reconfigure organizational structures so that public health, sickness care and social services can work together.

One program positively regarded by writers—perhaps due to its foundation as a federally conceived health initiative—is designed to offset nutritional deficiencies caused by food insecurity. Nunavut's adaptation of Canada's Prenatal Nutrition Program provides "vitamin D supplements to all pregnant and nursing mothers, babies and children under 2" (Minogue, 2007).

In Nunavut, the program not only focuses on increasing dietary intake of vitamin D, but also acknowledges barriers new mothers may face and develops skills to structure a well-balanced diet: "… health representatives lead lessons in cooking healthy food, emphasizing basic nutrition and using traditional recipes for foods such as bannock, seal stew and fish soup. New mothers also get lessons in thrifty shopping at the local grocery store" (Minogue, 2007). For other community members, "free vitamin D supplements in tablet form are available… [with] pamphlets describing different vitamins and their uses… translated into Inuktitut" (Minogue, 2007). Apart from vitamin D supplementation, the media coverage includes only one other Nunavut-led initiative targeting food insecurity: a food security coalition described by a paltry two lines at the end of an article describing Inuit-led protests: "Poverty and food security are now at the centre of the territorial government's agenda. A food security coalition has been formed with representatives of six different government departments, as well as Inuit organizations" (Weber, 2012). Seemingly included as a side note, this quote describing Nunavut's Food Security Coalition epitomizes the media discourse about food insecurity in Nunavut. It highlights Inuit-led efforts only after paying due diligence to the dominant "government as hero" and "Inuit as helpless" cultural motifs. By *choosing* to stress themes in this order, *GM* and *NP* writers reinforced colonial hierarchies to Southern Canadians, which can contribute to national racial apathy, neoracism, and the maintenance of a settler colonial Canada. The following discussion will describe how the two discursive themes outlined above—Federal involvement in the Arctic and social inequalities—coalesce to solidify the "government as hero" and "Inuit as helpless" cultural motifs.

Discussion: Food insecurity and Inuit othering in a settler colonial Canada

As the media discourse focused on social inequalities and Nunavut's determinants of health, *GM* and *NP* writers emphasized an "Us versus Them" mentality and effectively compartmentalized Canada's worst life expectancy, educational attainment, employment rates, teen pregnancy rates, and morbidity rates due to chronic conditions eradicated in the rest of the nation. Such tactics follow discriminatory print media practices that have contributed to Othering of Canadian Indigenous populations since the country's inception (Cronlund Anderson & Robertson, 2011). Writers frequently use rhetoric such as "compared to the national average", "highest rate in Canada", and "worst in Canada" to position Nunavut as having the least desirable outcomes for population health measures. These phrases enable readers from across Canada to compare their own conditions to Nunavut's and establish themselves as superior, a common settler colonial strategy (Cronlund Anderson & Robertson, 2011; Said, 1994; Smith, 1999). Most population statistics were reported in articles that focus on risk factors and morbidity rates associated with a specific health condition or social issue, and failed to contextualize the Inuit's efforts to alleviate their own problems. This ultimately misrepresents Nunavut and the Inuit as complacent about their own issues, and mimics media coverage of tuberculosis outbreaks in the Canadian Midwest

during the 18th and 19th centuries (Cronlund Anderson & Robertson, 2011; Daschuk, 2013). Doing so has created a two-stage self-strengthening loop between Othering and racial apathy.

First, depicting the Inuit as complacent in their current circumstances is a manifestation of national racial apathy (Garner, 2010), as it grossly misrepresents reality and enables the settler population to naturalize Nunavut social inequalities as a result of the Inuit's supposed helplessness. This depiction of the Inuit then perpetuates an "Inuit as helpless" motif, as it implies the Inuit are unable to solve their own problems and that a settler colonial approach (Veracini, 2011b) provides the best resolution to such social inequalities by continuing to assimilate the Inuit into Western culture.

Reporters also described Nunavut's social determinants of health with narratives that depicted Nunavut as a lawless territory, a tactic that print media relied on during the settlement of the Canadian prairies to justify withholding food and shelter from Indigenous populations (Cronlund Anderson & Robertson, 2011; Daschuk, 2013). Patrick White (2011) implicitly reinforced the government's position as "hero to the helpless" when he outlined a scene in which RCMP officers chase down a violent and intoxicated Inuit teen and then comfort him after he is apprehended. He depicted the young Inuit boy as disruptive and unorganized, traits that align with the territory's reported alcoholism abuse issues, and effectively vilifies the Inuit by contrasting him with the heroic RCMP officers who "save the day." Positioning the officers and Inuit boy in this manner reinforces Nunavut's cultural hierarchization, as the RCMP—and by extension settler society—are seen as a necessity to maintain order in an otherwise chaotic state. The "Inuit as helpless" motif remains at the forefront of discussions as discourse shifts to focus on Nunavut's food insecurity.

Food insecurity–focused stories were saturated with statistical proof of Nunavut's deplorable social conditions as writers attempted to define it. Stories focused on childhood rates of food insecurity and its manifestation as childhood hunger. While they capture the problem's endemic nature, reporters skimmed over food insecurity's impact on adults. However, drawing attention to childhood hunger and food insecurity may elicit a strong emotional response from reader, since children's health is often viewed as a Canadian social priority, and children are seen as "innocent victims" no matter whether parents or governments are held to be responsible for the problem. Therefore, framing food insecurity's effects on children creates a moral dilemma for Southern Canadians (Fairclough, 1995), as they may become conflicted between concern for Inuit children's well-being and the racially apathetic stance toward Inuit food insecurity fostered by Canadian media. This conflict may make it difficult for readers to cognitively distance Nunavut's social inequalities, due to their concern for the Inuit children's health, making them more likely to be affected by reports of high food prices.

Admittedly included to "shock most Southerners," writers saturated Nunavut food insecurity articles with reports of prices two to four times higher than most Canadians would experience. The media positively frames Northern grocery stores as they attribute such exorbitant food prices to high shipping costs, while the Inuit are framed as helpless to enact change, and foolish for remaining in the north instead of relocating to the south where

commodities are more affordable. Similar to the Inuit's relationship to Hudson's Bay Company representatives during the fur trade (Bonesteel, 2006; Creery, 1993), the modern Inuit-Settler dyad affords the Inuit little negotiating power to dictate the price of goods. Additionally, as writers describe Nunavut's food insecurity and high food prices, they effectively compartmentalize the issue using the 60th parallel—Nunavut's southern border—as an imaginary line that contains the territory's poverty and high food prices. Rhetoric such as "Northerners" and "Southerners" are frequently used to emphasize the hardships Nunavummiut face and sufficiently equate "North" with social disparity and "South" with prosperity. This stylistic choice to reduce Canada to two compartments allows the majority of Canadians to distance themselves from the issue, and fuels racial apathy as it naturalizes high food prices as Nunavut's cultural norm. Doing so diminishes the shock Southern readers may experience when writers compare food prices in the "North" and "South."

The media ostensibly buries proof of Inuit-led endeavors in order to publicize federal projects and ensure they are perceived, at the very least, as "the hero that tried." The media frame the federal government's Nutrition North program (Government of Canada, 2013) as a noble failure: it attempted to alleviate food prices for healthy food and cut costs by removing subsidies for other essential personal care products, however, it was implemented too quickly and failed to produce the desired results. By following reports of the failed Nutrition North program with details of Inuit protests, the writers allowed the government to retain its "hero" status, while propagating the "Inuit as helpless" motif through their portrayal as stereotypically angry natives, which has been a theme in Canadian newspapers since the country's inception (Cronlund Anderson & Robertson, 2011). Writers use the Inuit's reaction to high food prices to distract from the government's failed attempts, which if reported on their own would challenge the cultural hierarchy by portraying the government's efforts as a failure. Instead, the media frames the Inuit's efforts as substandard while those of the Canadian government are portrayed as feasible, reasonable, and responsible attempts to support its Northern populations.

Food insecurity discourse in the media has slowly begun to provide Inuit their due credit. Between 2011 and 2012 writers began including details about effective Nunavut- and Inuit-based public health interventions that apply a multi-faceted approach to absolve nutrition deficiencies caused by food insecurity. However, they are only ever included after the "hero to the helpless" theme appears to be exhausted. Therefore, since the main concepts for Nunavut's food insecurity discourse are mainly constructed in articles focusing on other aspects of the territory, it is evident that the reporting on food insecurity is a small part of a broader Othering discourse that has become disguised in Canada's post-colonial era.

Conclusion

In this study, we used a critical discourse analysis to examine Nunavut's food insecurity as a function of socially constructed, culturally discriminatory ideologies and its representation in two

of Canada's largest print media sources: *The Globe & Mail* and the *National Post*. In doing so, we found two overarching discursive themes that categorized the sample: social inequalities and food insecurity. Within these discursive themes we have identified two recurrent cultural motifs, "Inuit as helpless" and "government as hero," which indicate the maintenance of a culturally hierarchized North. It became apparent that these motifs represent culturally discriminatory ideologies embedded in Canadian national media.

Throughout its coverage of the crisis, these Southern media outlets established and reinforced the dominant position of the Canadian government and its representatives, as well as the passive and submissive position of the Inuit in Nunavut. Stories consistently frame the Inuit as inept, incapable, and helpless to come to their own assistance or to hold the federal government to account for the ongoing repercussions and consequences of colonialism. Social issues were often misrepresented and naturalized to either the Inuit culture or the Northern locale, allowing Southern Canadians to cognitively distance themselves from social injustices that exist within our nation as a result of settler colonialism. The Southern media's construction of Nunavut's food insecurity discourse represents just a small part of a greater Othering discourse that has become disguised in settler colonial Canada. By choosing to frame Nunavut's food insecurity in this manner, it is evident that *GM* and *NP* propagate settler colonialism and are key actors in both the proliferation of national racial apathy toward the Inuit and the institutionalization of cultural discrimination.

This study is not without its limitations. First, restricting our search to *GM* and *NP* limited the potential range of perspectives included in our analysis. Additionally, this limited our examination of the national discourse regarding Nunavut food insecurity to sources targeted to *GM* and *NP* audiences, which are relatively well educated individuals from the middle class and above. Another limitation is the frequency with which Patrick White is included in the discourse; his 2011 article was substantially longer than all others included in the sample at 7,730 words. Its omission, however, would have been irresponsible since a discursive element's weight should not be decided by word count.

Further research is needed to analyze additional newspaper outlets, especially those published by and targeted to Nunavummiut, and other forms of news media to determine the full scope of the institutionalization of cultural discrimination and racial apathy regarding Nunavut food insecurity. Since different news outlets and sources target different audiences, such studies would provide insight into the true scope and depth of racial apathy in Canadian society, including the ways in which it manifests itself in different sources, given the target audience. Further studies should also seek to uncover different aspects of Nunavut's Othering discourse, with the ultimate goal of uncovering how these discourses inform federal and territorial policy decisions. These studies should examine how discourses are taken up into and are produced by policy. Certainly a daunting task, this research would more fully expose the cultural hierarchy that remains in Canada's north, and would provide Canadians with a full picture of Nunavut's relationship with Canada. It would act to dispel national racial apathy by exposing all counts of misrepresented social situations. We anticipate that our research will illustrate how a public

health issue such as food insecurity can be dissected using discourse analysis to reveal deeply rooted discriminatory cultural norms and hierarchies.

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Review Article

New CSR in the food system: Industry and non-traditional corporate food interests

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Abstract

Throughout the twentieth century, the food system has not only undergone changes in structure and in process, but has also shown a growing transformation in food system governance. Often this transformation involves private actors engaging in the policymaking and governance arena. This paper draws on corporate social responsibility (CSR) as a private governance mechanism that is frequently used by corporate food actors. The rise of industry's participation in non-traditional corporate food interests (NTCFIs), or social and environmental concerns, will be explored by drawing on changing governance structures in the food system. NTCFIs move beyond traditional interests of corporate actors such as trade, economic regulation, and competitiveness, and reach into social and environmental issues found in the food system that are often a result of agri-food production and its business practices. This paper problematizes the increased CSR of corporate actors in social and environmental issues in the food system. It considers both sides of the debate: an optimistic view of business engaging in NTCFIs, and a more skeptical view. It concludes with a third, middle ground view, stating that given the power and resources of corporate food actors, industry should be involved in food system change at arm's length in a tripartite partnership: civil society, government, and the corporate sector.

Keywords: food industry; corporate social responsibility; non-traditional corporate food interests; food governance

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Introduction

> *"… [T]he large corporation has become the most important new political institution in the contemporary political order" (Mitchell, 1986, p. 208).*

The twentieth century saw a transformation in the way food was produced, distributed, consumed and controlled, with multiple consequences for policy and governance (Lang, 2003). This changing food system was characterized by a progression of complex health, social, and environmental crises, signalling a need for new mechanisms of governance. One result was the emergence of a dual governance comprised of various public and private actors as well as international organizations (Havinga, van Waarden, & Casey, 2015), creating a state-led regulatory system, and a self-regulatory system (Havinga, 2015; Lang, 2003). Scherer, Palazzo, and Matten (2014) argue that the involvement of non-state actors in policymaking is a relatively new phenomenon, developing from politico-economic changes produced by globalization in the 1980s and 1990s. They argue that the politico-economic changes displaced the traditional powers of the state, leaving certain regulatory and policy vacuums, often in areas that have become privatized or are transnational and "wicked" in nature.

Under these circumstances, private actors are seen by some as stepping in and behaving as political actors (Scherer, Palazzo, & Matten, 2014), developing private governance in various ways such as corporate social responsibility (CSR), standards, and certifications (Fuchs, Kalfagianni, & Havinga, 2011). In the food system, corporate political involvement through private governance is seen in public health issues in the food sector (Sharma, Teret, & Brownell, 2010), food safety (Havinga, 2006), environmental management and animal welfare on the farm (Richards, Bjørkhaug, Lawrence, & Hickman, 2013), as well as supply chain management (Burch & Lawrence, 2005; Fuchs & Kalfagianni, 2010; Hatanaka, Bain, & Busch, 2005).

The purpose of this paper is to explore different perspectives concerning the engagement of corporate food actors in CSR to better understand industry's involvement in political, social, and environmental issues in the food system. I draw on CSR in particular as a private governance mechanism, and as a way in which the firm becomes a political actor (Scherer & Palazzo, 2011; Scherer, Palazzo & Matten, 2014) that is willing to engage in and undertake "political responsibilities" in areas of human rights and the enforcement of standards (Castelló & Lozano, 2011). I argue that there is an increased tendency for the private sector to get involved in the policy and governance process through what I call non-traditional corporate food interests (NTCFIs). These are concerns that move beyond traditional interests of corporate actors that were the foundation of the older CSR (described below) such as trade, economic regulation, and competitiveness.

Examples of NTCFIs can be initiatives around healthy food, food security, animal welfare, local food, and other social and environmental issues. The current CSR practised by corporate food actors is based on industry developing alternative policies and programs for NTCFIs. This becomes a confusing governance phenomenon when the private sector begins engaging in concerns many see as being created through their production and corporate

business models. Some look at industry's involvement in these issues skeptically, as a form of greenwashing and gaining legitimacy. Others argue that this is a new and important step towards corporate citizenship and social responsibility of industry.

This article examines that debate and demystifies the new development of food companies incorporating social and environmental policies into their corporate priorities. I begin by briefly discussing CSR as a concept, and then by exploring NTCFIs in more depth, with a few specific examples. Then, borrowing some analytical tools from the business management discipline, I analyse both sides of the debate regarding corporate political involvement in NTCFIs, beginning with the optimistic perspective. This is followed by a third view of CSR and corporate engagement in food system change, drawing on the idea of a multi-stakeholder partnership. I conclude by summarizing the outcome of the debate, and calling for more empirical research on CSR and the food industry.

Corporate social responsibility (CSR)

There are many different types of CSR. Auld, Bernstein, and Cashore (2008) identify seven types of which some include standards, codes of conduct, and private sector hard law such as the Marine Stewardship Council. CSR, is defined very broadly by Windsor (2006) as a way in which firms should deal with public policy and social issues. This behaviour goes beyond what is required by law and the market (Auld, Bernstein, & Cashore, 2008). There is no single formula as to how CSR can be carried out. In fact, there is no consensus in the literature on its very definition (Chandler, 2014; Freeman, Harrison, Wicks, Parmar, & de Colle, 2010), however each definition shares the common idea of expanding the duties and responsibilities of business beyond financial matters (Freeman et al., 2010).

Recently authors (Auld, Bernstein, & Cashore, 2008; Castelló & Lozano, 2011; Scherer & Palazzo, 2011) have been identifying differences between an older and newer version of CSR. Older CSR practices largely consisted of corporate philanthropic activities, for the most part, unrelated to the core practices of the organization (Auld, Bernstein, & Cashore, 2008). Castelló and Lozano (2011) find that new CSR engages with stakeholders more than the old one. New CSR involves a firm's engagement in the promotion of social and environmental standards through modifying its core practices and internalizing negative externalities, rather than deflecting them (Auld, Bernstein, & Cashore, 2008). It engages in specific environmental and social activities which in the past tended to be the responsibility of government (*ibid*), making it more political than the old CSR. In this paper, I will be referring to new CSR which includes a combination of Auld, Bernstein, and Cashore's (2008) types of CSR outlined above.

Food industry's involvement in non-traditional corporate food interests (NTCFIs)

The growing number of food industry actors engaging in NTCFIs through CSR is becoming increasingly visible on many levels. Specific examples of business engaging in NTCFIs can

be found within individual firms. There are abundant examples of companies engaging in NTCFIs on their own, but for the purposes of this paper, I will focus on two popular governance areas: animal welfare, and food literacy.

Animal welfare initiatives have been most popular in fast food chains shown through efforts to source more "humanely produced" meat products. A recent wave in the fast food world has centred on the elimination of gestation crates for pigs and battery cages for hens. Several fast food chains are engaging in new animal welfare initiatives including Wendy's, McDonald's, Burger King, and Chipotle, for instance. Wendy's promotes an animal welfare program outlined on their website with guidelines on the use of antibiotics, and how animals producing beef, chicken, and pork meat products for Wendy's should be housed, transported, handled, and unloaded. Similarly, McDonald's US announced in 2012 that by 2022 it would no longer source pork from producers that use sow gestation crates (Huffstutter, 2012; McDonalds, n.d.). In the same year, Burger King vowed to end egg sourcing from producers using battery cages, and only source pork from producers who are working to eliminate gestation crate practices (Baertlein, 2012).

Many other companies are also jumping on board the animal welfare bandwagon. Perhaps the biggest animal welfare effort comes from Chipotle, with an animal welfare initiative intertwined with their overall food sourcing strategy. The initiative has a general approach identified by the company as "food integrity", outlining various ways in which the company sources ingredients for their products. On their website, they state: "Chipotle is seeking better food from using ingredients that are not only fresh, but that—where possible—are sustainably grown and naturally raised with respect for the animals, the land, and the farmers who produce the food" (Chipotle, 2015, p.13). Chipotle is also making efforts to shorten their supply chains by sourcing ingredients from local farms. Many of their NTCFI initiatives are featured in videos on YouTube showcasing the producers and farms from which Chipotle sources its products. Several of these videos deconstruct the ideas and practices behind industrial farming, some even featuring farmers denouncing it. One of Chipotle's big animal welfare campaigns emphasized sourcing pasture-raised animals without nontherapeutic antibiotics and synthetic hormones.

Other food companies have been focusing on "food literacy", that is, encouraging and educating its consumers on how to eat and prepare fresh and healthy food. In addition to animal welfare initiatives, Chipotle has been actively engaging in educating consumers about the food system. It does this through storytelling online as well as through its Chipotle Cultivate Foundation (Chipotle, n.d.). Canadian grocery store chain Metro has rolled out a healthy food literacy program called *My Healthy Plate*, partnering with experts like dieticians and academics. Metro's dietitians have created a smile label that is used in-store to inform the consumer whether a product is a "good" or "great" choice. As a result, consumers do not have to study the nutrition labels while shopping (Metro, n.d.a.). Recipes are also provided on Metro's website highlighting the use of unprocessed ingredients to increase the nutritional value of the food consumers eat. Four pillars outline their program: "[To] [i]mprove our product range to promote healthy eating; help our customers select healthy food products; provide access to healthy products at affordable prices; and promote healthy eating habits in the community" (Metro, n.d.b). In addition to this, in the summer of 2014, Metro created its

own food truck that travelled across ten Québec festivals showcasing local Québec food, recipes using local foods, and local store owners (Kashty, 2014).

In 2013, Sobeys partnered with celebrity chef and food literacy activist, Jamie Oliver, in its *Better Food Movement* campaign. Jamie Oliver makes regular appearances on Sobeys' YouTube channel, with announcements, recipes, or promotions for products, like Sobeys' certified humane meat. Sobeys website states: "Jamie Oliver is working with us to champion enhanced food knowledge, balanced nutrition, quality ingredients, and cooking skills for Canadians" (Sobeys, n.d.). There are also many recipes and links with social media campaigns having to do with particular food ingredients or seasons.

Similarly, in 2007, Hellmann's, a Unilever owned mayonnaise company, launched the *Real Food Movement* which is also a food literacy initiative. Hellmann's states that it started the initiative to "help Canadians connect with and understand the delicious benefits of real food" (Hellmann's, n.d., p. 2). They have "…developed toolkits, guides and interactive recipes to help families realize how easy it can be to bring more real food to their tables" (ibid). With the campaign's launch, Hellmann's developed a grant program that funds initiatives to help educate children in food and food preparation. In 2014, Hellman's set up the "Real Food Truck" at the Canadian National Exhibition in partnership with Chef Lynn Crawford of the Food Network, which sampled "real food" snacks featuring Hellman's mayonnaise.

While there are plenty of other examples of industry engaging in NTCFIs on various levels, this brief list has presented a handful of firm-level examples with animal welfare and food literacy initiatives, showing new ways in which companies are engaging in CSR in the food system. The following sections will introduce two perspectives that can be used to better understand industry's engagement in NTCFIs, as well as a third alternative approach.

Corporate social responsibility: Optimistic perspective

One perspective of CSR in the food system is an optimistic approach which stems from understanding changes in the state, and the increase in private governance through CSR. This means that CSR is viewed in a positive way, both for business and society. The reasons behind engaging in CSR are therefore constructive, genuine, and are based on the promotion of the well-being of stakeholders rather than solely on financial goals. This of course does not mean that financial considerations are ignored. Two major analytical approaches will be identified below: corporate citizenship (CC) and creating shared value (CSV). Other approaches will not be discussed here because they are not directly pertinent to industry engaging in socio-political behaviour. Some examples include corporate social performance which is a way to measure industry's involvement in socio-political issues; corporate political strategy which discusses plans to influence government policy to benefit industry competitiveness (Hillman & Hitt, 1999); and stakeholder theory/management focuses on the firm's purpose, and its stakeholders beyond its shareholders (Donaldson & Preston, 1995; Freeman et al., 2010).

Corporate citizenship

In the past few decades, corporate actors have begun to take on activities largely regarded as state activities through self-regulation and the filling in of legal and governance gaps (Scherer & Palazzo, 2011). This phenomenon is contextualized through the transformations in international political economy stemming from globalization as well as the resulting shifts in the role of the state, which by consequence, imply changes in governance (Bevir, 2012; Kennett, 2008; Peters & Pierre, 1998; Pierre & Peters, 2000). These changes come from "old government", a hierarchal order of authority and administration vested in the state holding dominance in the policy process (Kennett, 2008), to new governance, where the state is only one of several players in the policymaking arena. This governing shift has blurred the boundaries between private and public actors and changed the nature of the policy process. Due to the state's decreased ability and/or willingness to govern in certain areas, new forms of governance arrangements beyond the state have been emerging (Scherer & Palazzo, 2011), creating a shift from "government" to "governance" (Peters & Pierre, 1998). This has also incited a growth in private governance expressed in industry's involvement in codes of conduct, CSR, private certification and labelling (Fuchs & Kalfagianni, 2012).

Through the withdrawal of the state in particular policy areas, and the subsequent engagement of industry actors in them, corporate citizenship (CC) is a useful concept to use when trying to understand this governing shift. Carroll (1998) argues that CC is made up of four faces: economics, law, ethics and philanthropy. Therefore, good corporate citizens are expected to fulfill their economic responsibilities and be profitable, fulfill their legal responsibilities and follow the law, be receptive to ethical responsibilities, and engage in philanthropy. CC has been increasingly used by firms and in academia to rework facets of CSR (Moon, Crane, & Matten 2005). Matten & Crane (2005) and Matten, Crane, and Chapple (2003) find that definitions of CC like Carroll's (1998) are very similar, if not identical to CSR. As such, they provide an "extended" definition of CC considered in this paper, showing a shift in the role of corporate actors to a more political role in society.

They begin with the concept of "citizenship". When thinking of corporate actors as citizens in a literal sense, this implies that like every other citizen, they have rights, duties, and are citizens of the country in which they do business. Matten and Crane (2005) follow T.H. Marshall's definition of liberal citizenship as based on civil, political, and social rights. Civil rights include freedom from abuse, government intervention (negative rights), as well as the right to freedom of speech, and to own property. Political rights entail the person's active participation in society, such as the right to vote and hold office (Matten & Crane, 2005). Lastly, social rights allow a person to participate in society, through education, healthcare and other forms of the welfare state.

Matten and Crane (2005) contend that the state is traditionally considered as the guarantor of liberal citizenship. However, with the changes in the role of the state and the retrenchment of the welfare state, corporate actors have been filling the vacuum left behind by the state and securing some of the rights of citizens under liberal citizenship. Thus, "'corporations' and 'citizenship' come together in modern society at the point where the state ceases to be the only guarantor of citizenship…" (Matten & Crane, 2005, p.171). Three

instances are identified in which the roles of managing citizenship are changing: (1) when government no longer carries out citizenship rights, (2) when government has not yet carried out citizenship rights, and (3) when the carrying out of citizenship rights may be beyond the reach of government. Drawing on these ideas, Matten and Crane (2005) redefine CC, as "…the role of the corporation in administering citizenship rights for individuals" (p. 173). The corporate actor is not so much a citizen as an actor standing in on behalf of the state, at times, to secure facets of liberal citizenship. Under CC, corporate actors tend to become guarantors of the social rights pillar of liberal citizenship (Matten, Crane, & Chapple, 2003). Examples of corporate actors engaging in securing social rights, such as the right to (healthy) food for children, can include contributions and development of anti-hunger and healthy food programs in schools.

Drawing on the CC literature, industry engaging in NTCFIs can be seen as a way for corporate actors to engage in private governance through CSR efforts. If corporate actors are taking up the role of corporate citizen in the way that Matten and Crane (2005) and Matten, Crane, and Chapple (2003) are suggesting, then this development implies that corporate actors are in fact filling the state policy vacuum in the food system through securing social rights for citizens in the form of CSR. Different educational and environmental rights can be supported through corporate actors' CSR efforts, as seen through food literacy initiatives and calls for a more sustainable food system. Thus, thinking in terms of CSR as CC, a different system of governance in the food system may be emerging that will come to depend on private governance for NTCFIs, rather than on government stepping in to create food policy and secure social rights linked with the food system.

Creating shared value

Creating shared value (CSV) is another optimistic view of CSR. It was coined by Porter and Kramer in *Harvard Business Review* in 2006 in an article entitled "Strategy and society: the link between competitive advantage and corporate social responsibility". Here the authors introduced a new business perspective that centres on the interdependence of business and society rather than on its tensions and argues for "anchoring" CSR in a company's business strategy.

Porter and Kramer (2011) maintain that CSV is viewed from a broader conceptualization of capitalism. Business is not seen positively in society due to the use of an outdated model of value creation. Value is often considered as a narrow subset of short-term financial successes which overlook changes that would support long-term success. Social and environmental issues have often been pinned against business success, treated and institutionalized as trade-offs between the well-being of society and the success of business. Neoclassical economists have structured the economy as a zero-sum game between society and business. Social contributions or improvements are seen as taking away from the successes and prosperity of business, raising costs of firms and decreasing profits. In contrast, shared value is based on the idea that traditional economic needs combined with societal needs make up the market.

Often, working against societal needs hinders the productivity and success of a business through the creation of internal costs. However, CSV blends issues that have always been seen as trade-offs with the core business of a firm, and creates a new approach that fuses society and business. Thus, business value is created at the same time as societal value, hence the idea of *shared* value. This is an approach that lies at the very core of a business' everyday existence. However, Porter, and Kramer (2006) caution that corporate actors should only choose causes that are both a benefit to society and to their prosperity to best address some of the world's social issues (Porter & Kramer, 2006). CSV is not about sharing an already created value or redistributing value and profit, but rather about expanding the value in both economic and societal spheres.

This value is created in three ways "by reconceiving products and markets, redefining productivity in the value chain, and building supportive industry clusters at the company's locations" (Porter & Kramer, 2011, p. 67). The authors explain that by reconceiving products, industry increases innovation and creates products that are fundamentally necessary or useful for people, or relate to their top concerns. Many of the NTCFIs identified in the section above fall into this category. In the food system, this could be a product that is produced more sustainably, or a product that has more or less of a particular attribute (i.e. salt, sugar), or none at all (i.e. trans fat, antibiotics and hormones used in meat, etc.) that targets consumer health concerns. Products can also focus on consumer worries about animal welfare, labour concerns (fair trade compliance), and even one many Canadians now take for granted, food safety. Value in these cases is shared between consumers and companies where specific consumer concerns are being met, while increasing (or maintaining) the profit margins of a firm.

Second, redefining productivity in the value chain is crucial given that value chains affect and are affected by societal issues. An example Porter and Kramer (2011) provide is plastic packaging. Through decreasing plastic packaging, a company contributes less to pollution, global warming, etc. At the same time, it also uses fewer resources to wrap its products, has lower disposal fees given that there is less plastic to dispose of, has smaller orders of plastic packaging, etc. The same can be said of being more energy efficient in the value chain—something that is better for the environment and for the bottom line of the company (Porter & Kramer, 2011). In the food system, this can mean creating compostable or recyclable packaging, using renewable energy to process or package food, and even sourcing more locally to decrease a company's carbon footprint. The food industry pays attention to sustainability and packaging, but recently, it has become quite concerned with food waste. For example, in order to mitigate produce waste, Loblaw has introduced an "ugly duckling" line of fruits and vegetables that are considered imperfect produce. Instead of using this imperfect produce for processing or disposing of it, Loblaw has opted to sell it at a discount. Redefining productivity can also mean creating educational programs for a food company's suppliers which has been a popular strategy especially amongst coffee and cocoa sourcing companies.

The last component of developing social value is building supportive clusters around the business location. This involves developing strong supply chain networks with supporting businesses, suppliers of products and services, and other infrastructure (Porter & Kramer,

2011). The authors argue that these draw not only on other businesses, but also on academic and trade communities. Having sustainable and effective clusters within the firm's surroundings better connects it with the community, and increases productivity. If we take the example of Chipotle again, local food sourcing has become a strategic move to shorten the supply chain. This creates shared value through generating profit and employment for local producers while at the same time benefits the company which does not have to source produce from distant places. Other examples include hosting community food workshops or creating educational programs for consumers to learn about healthy eating. The company's successes become the community's and vice versa (Porter & Kramer, 2011).

Proponents of CSV argue that CSV focuses on creating capital and profits with a social purpose that will allow capitalism to function at a higher level and provide increasing opportunities for profitable success and innovation. The best opportunities for CSV for companies will inevitably be tied with things they already value or are closely tied with their business. This is a vision that is not intended to take away from business, from economic competition, capitalism or any form of profit. It is one that is seen as complimentary and fundamentally integrated with the future of capitalism (Porter & Kramer, 2011).

Corporate social responsibility: Skeptical perspective

A different perspective on CSR is the very opposite of the first—a skeptical approach. This means that any participation in CSR efforts is solely underlined by the financial considerations and economic well-being of business. There is therefore no genuine will to support any social or environmental causes beyond the positive ramifications for business' self-interest. This perspective is grounded in the understanding of neoliberalization and the subsequent capital exploitation that had transformed the market and led to new strategies increasing capital accumulation. This section identifies two general approaches as anti-business views of CSR: the search for legitimacy, as well as increasing profits.

Seeking legitimacy

The first analytical approach proposed to understand industry's increased participation in NTCFIs, involves the need for increased legitimacy in the food industry to maintain current power configurations. Castelló and Lozano (2011) claim that corporations have been seeking more legitimacy, especially moral legitimacy, through various CSR efforts. It is being used as a tool to legitimize business activity due to an increase in disagreements with stakeholders (Heyder & Theuvsen, 2008).

Legitimacy influences the way in which people act towards organizations, as well as how they understand and view them (Suchman, 1995, p. 575). Legitimacy can be defined as "…a generalized perception or assumption that actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574). Legitimacy of a given organization therefore is based

on the perception of observers that identify congruence between the actions and behaviours of an institution, and their own values, norms, beliefs, and expectations (Palazzo & Scherer, 2006, p. 71). This reflects a neo-institutionalist perspective of the corporation as an embedded institution in society that attempts to align itself with societal norms and expectations in order to continue existing (DiMaggio & Powell, 1991).

Corporate legitimacy more specifically, looks at the role of business in society (Palazzo & Scherer, 2006, p. 72). For a few decades now, corporations have been scrutinized by non-governmental organizations (NGOs), and as such, have been in conflict with civil society (Palazzo & Scherer, 2006; Rayman-Bacchus, 2006). These conflicts have not only endangered the reputations of particular firms, but have sparked critical questions about the role of business in society, and undermined the public's trust in corporate integrity and morality (Palazzo and Scherer, 2006). Without legitimacy, corporations lose power in society (Mitchell, 1986).

Suchman (1995) identifies three general types of organizational legitimacies: pragmatic, cognitive, and moral. *Pragmatic legitimacy* is grounded in the self-interest of the organization's audience. If the corporation acts and behaves in a way that benefits the audience, then it is considered legitimate. Pragmatic legitimacy is attained through lobbying, branding, and strategic public relations. *Cognitive legitimacy* is a sub-consciously granted legitimacy (Palazzo & Scherer, 2006), where the audience sees the organization and its actions as inevitable and necessary, making it very difficult for an organization to influence this type of legitimacy (Suchman, 1995). It is achieved through "shareholder-value ideology, free and open market narratives…" (Palazzo & Scherer, 2006, p. 78). However, Palazzo, & Scherer (2006) argue that all of the methods and venues used to achieve pragmatic and cognitive legitimacy have experienced growing opposition from various civil society actors and social movements (p. 78). As such, industry requires moral legitimacy for social acceptance, since the two remaining legitimacies have been waning. *Moral legitimacy* is normative, based on whether the organization is perceived as doing "the right thing", and if it benefits society as a whole. It is therefore the most important type of legitimacy for corporations to strive for in present society (Palazzo & Scherer, 2006).

Corporate actors often use discourse, storytelling and symbolism to appeal to certain values and frame certain issues. This creates authority on the basis of legitimate argumentation and protection of the public good, constructing moral legitimacy through CSR actions (Fuchs & Kalfagianni, 2009, p. 255). These ideas can be considered as reinforcing and legitimizing corporate actors' actions in the food system through discourse. As Fuchs and Kalfagianni (2009) argue, in the case of retailers in the food system, discursive power is the most important force used to achieve legitimacy. Discursive power "…is seen to be a function of norms, ideas, and societal institutions. It is reflected in discourse, communicative practices, and cultural values" (Fuchs & Lederer, 2007, p. 8), thus working largely with language and ideology. This power can inhibit the existence of certain interests or conflicts appearing on the policy agenda (p. 9), as well as make other interests and values appear legitimate (p. 10). Corporate actors are now spending more time and resources on shaping and defining particular issues (Fuchs, 2005, p. 789). Various animal welfare and food literacy initiatives can be considered as attempts to gain moral legitimacy, showing that industry is

"doing the right thing", while creating the consent needed to continue the current power configurations of the food system.

As such, this perspective argues that industry's recent involvement with NTCFIs through CSR can be viewed as a way to reinforce the declining moral legitimacy of corporate food actors. Often, the type of discourse used on packaging, in mission statements and in programs that businesses provide through CSR efforts aligns well with the ideas of food movements looking for healthy, just, and sustainable food systems.

Increasing profit

Generally, under this perspective, CSR is viewed as "strategic CSR". That is, a "profit maximizing strategy" that may be considered by some as socially responsible (Baron, 2001, p. 17). Under this perspective, the final responsibility of the firm is not to its broad base of stakeholders, but to its shareholders who require the maximum return on their investment. Coors and Winegarden (2005) maintain that a business focusing on pleasing its broad base of stakeholders, rather than its shareholders will not be financially successful. If a company is engaged in non-profitable CSR it "…would either lower company profits, raise prices, lower wages, lower the number of employees hired, or a combination of all four" (p.11). This, however, does not happen, they argue, if a firm's CSR is set up to be profitable, or one that consumers are willing to pay for. For this reason, firms will only engage in CSR if it is profitable for them and increases their market share. This perspective broadly draws on CSR for profit creation rather than generating societal value by focusing on product differentiation, advertising, and greenwashing.

Not only can CSR be used to increase a company's legitimacy, but it can also be used to increase its profit by differentiating itself from other firms (Pollach, 2015). Coors and Winegarden (2005) argue that voluntary CSR is nothing more than an opportunity to advertise and sell new products with new features. CSR can create this differentiation of products through "…a bundle of valuable, rare, in-imitable, and non-substitutable resources, such as processes, equipment, knowledge, capabilities, attributes, and unique corporate cultures" (Pollach, 2015, p. 60).These unique characteristics can create a positive reputation for the firm, recognizing it as a trailblazer, a first mover, or as a thought leader (Pollach, 2015). A positive reputation creates a competitive advantage for the firm. Companies can use CSR as a substitute for advertising, and so the decision to engage in CSR becomes a marketing decision (Coors & Winegarden, 2005).

Similar to advertising and product differentiation, *greenwashing* is also a way in which companies use CSR to boost profits (Alves, 2009). Greenwashing occurs when companies develop environmentally friendly processes, attributes, and contribute to charities that have to do with creating a greener world. Although greenwashing largely focuses on environmental issues, its approach relates to companies engaging in social causes as well. Greenwashing is thought to be a tactic used by business for "…branding, public relations, and legal value" (Alves, 2009, p. 2). Alves (2009) argues that through sustainability and environmental CSR, corporate actors continue to be more interested in their bottom line through the quantification of their "green" behaviour, with a fundamental goal of increasing

profits. Through engaging in CSR and aligning oneself with the values and concerns of society, firms not only create and retain consumer loyalty (Alves, 2009), but also build their reputation as a responsible business, promoting a positive corporate reputation. Green marketing or the advertising of the firm's CSR activities attempts to sell "…the desirable ideas, emotions, and/or experiences" (p. 5) of living an eco-lifestyle.

CSR can help companies differentiate their products by giving it different attributes that are attractive to consumers, or by engaging the firm in specific campaigns. This can generate positive perceptions of a firm engaging in CSR, especially for a first-mover which is perceived to be sincerer in its CSR actions rather than late adopters who are seen as imitators (McWilliams & Siegel, 2011). CSR is a way for companies to create profit through the provision of some kind of public good to attract customers that value specific attributes, such as eco-labelling (Bagnoli & Watts, 2003, p. 439).

This perspective of CSR maintains that CSR is nothing more than a tool to boost profits for a firm, where any societal benefits are considered by-products and afterthoughts. This is seen in the food system in various ways: environmental or social certification and labelling (including animal welfare), developing and following various codes of conduct, or attempts to educate the public about healthy eating, cooking, or the food system in general.

A third approach?

Different ideological stances on CSR were explored in this paper with regards to how they can make a difference in the way industry is seen to be interacting with social and environmental issues. Generally, there are two approaches when looking at industry's involvement in these matters which were outlined above: optimistic and pessimistic. Could there be a third approach, one which considers an area in between a positive and negative view of CSR?

It is obvious that industry is not an innocent bystander in the food system, and that many issues the system is experiencing have developed because of industry's production methods and business practices. Some may argue that solutions without corporate involvement can be difficult, but there are also dangers of co-optation and greenwashing. Likewise, concerns around conflict of interest exist when industry engages in NTCFIs. In areas such as food literacy, CSR can run counter to a company's bottom line. For example, a company such as Hellmann's specializing in the production of mayonnaise (generally not considered a healthy food product), a company which is also owned by Unilever (producing many processed and unhealthy food) developing a food literacy program shows conflicts of interest. It is contradictory to produce and sell unhealthy food while encouraging healthy eating. This predicament may prompt some to completely reject the idea of having industry involved in any food system change. However, given the resources and power corporate actors possess, it may be wise to include them as part of the solution. Instead of dismissing their involvement, mechanisms need to be developed to engage industry at arm's length. This can be done by keeping industry in check with the help of other partners that are accountable to the public (i.e. government and civil society).

Many companies are increasingly becoming aware of the structural issues of the accumulation process and realize that if they do not deliver change, they will cease to exist. The food industry is not against food system change; however, it does want to continue to benefit economically. Corporate food actors are finally realizing that they need to alter the way they do business. This may be a strategic moment for food system change of which other, less powerful actors, should take advantage. Civil society has become a very important player in pressuring corporations to limit their negative impacts on society in addition to engaging with many social and environmental issues (Gunningham, Gagan, & Thornton, 2004). It can become an actor that disrupts a potentially industry dominated renegotiation of the food system.

Some authors (Hamann & Acutt, 2003) suggest that strategic partnerships between business and civil society can occur through tripartite partnerships between civil society, corporate actors, and government. Tripartite partnerships, or multi-stakeholder partnerships, are networks of public and private actors, often between the government (or supranational institutions), civil society, and business. Like policy networks, these actors come together to collaborate on a common approach to solve an issue that affects all of them and is too complex to be solved by one actor alone (Roloff, 2008). Civil society can act as a mechanism to balance interests in the tripartite partnership, and the catalyst needed to disrupt the current food system to create meaningful change.

Developing multi-stakeholder partnerships may also help open communication channels between food actors that rarely or never interact. These partnerships may also help food actors move beyond what Clapp (2016) describes as an impasse based on a binary food policy debate. This is a debate that is polarized because of different manners of communication, vocabularies, values, goals, languages, and ideologies. It has prevented the creation of a crucial “middle ground consensus” needed to move forward in the development of a more just and healthy food system. Developing and fostering genuine partnerships and open discussions may help food actors from different positions of the debate embrace the complexity involved in the food policy space.

Conclusion

Several crises in the global food system are emerging as a result of the practices in the current food regime. Many of these crises include social and environmental issues—areas with which industry actors tend not to engage. However, this paper argues that industry actors are becoming increasingly involved in these matters, identified here as non-traditional corporate food initiatives (NTCFIs). A few examples were identified at the firm level which tended to concentrate on animal welfare and food literacy.

Two perspectives were presented as ways in which corporate involvement in NTCFIs can be better understood. The first was an optimistic approach to business engaged in NTCFIs through CSR; it included two avenues: corporate citizenship, and creating shared value. The second perspective involved a skeptical outlook on corporate engagement in NTCFIs by looking at ways in which it helps business create and maintain legitimacy, as well

as how it helps business boost profits. Following this binary debate of CSR, a "grey" approach was presented, one that lay between both the optimistic and pessimistic perspectives. It considered the dangers of including industry in food system change, but also discussed critical motivations for its inclusion.

This review paper focused on analytical perspectives involving corporate engagement in CSR, especially relating to NTCFIs. Bringing business language used by industry and business scholars into food studies can help bridge the divide between food studies and business. It can further develop the interdisciplinarity of the field, as well as equip food studies scholars with new conceptual tools to examine food policy and governance. Food policy and governance scholarship could benefit most from this review by considering changes in the way policy actors, especially private corporate actors govern in the food system.

Many social and environmental issues in the Canadian food system are, to date, not being adequately addressed (if at all) by government. Considering different positions on corporate engagement in the food system can provide future governance outlooks, offering clues as to how and why state and non-state actors will engage with policy. Brownell and Warner (2009) discuss the tobacco industry; however, their argument rings true for the food system. They state that "Whether, and how much, the industry chooses to respond in a responsible manner will determine whether, and how much, formal governmental regulation of industry behavior will be required to redress challenges to the public's health posed by industry products and marketing behaviors" (p. 264). Canada is at the cusp of a changing approach to food policy and governance. If government is waiting on industry to make the first move in remedying many of these food system issues, the government's involvement will depend on industry's (and civil society's) continued engagement in NTCFIs. This will, to a certain extent, determine the future governance model of the Canadian food system.

There is need for more empirical research in the area of food industry and CSR, especially focusing on the impact this engagement has not only on the future of policymaking, but also on the creation of new industry benchmarks in the food system. More research also needs to be done regarding how civil society fits into this picture, as well as how it fits into a tripartite partnership that is able to work towards a more sustainable and just food system.

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Review Article

Making better use of what we have: Strategies to minimize food waste and resource inefficiency in Canada

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Abstract

We examined the problems of and solutions to food waste through the main three frames of social science research on food waste: political economy; the *cultural turn* (the cultures, ideologies and politics of food and consumption); and political ecology. In the course of our collective research on food waste, we analyzed dozens of government and company documents, interviewed over 35 employees of food chain firms and organizations, including 9 middle to senior managers in food retail, and 2 farmers. One co-author, as part of this and affiliated work (McCallum, Campbell & MacRae, 2014), toured distribution facilities and stores of a major Canadian food retailer, had access to the Company's head office staff, held group and one-on-one interviews with staff in a variety of capacities, and was granted access to confidential corporate reports. Another co-author volunteered with a food recovery organization and spoke with their operational staff. Our method to identify solutions is described in more detail below, but essentially we follow a normative approach as broadly outlined by MacRae and Winfield (2016).

Our focus in this paper is on changes to policies, programmes and legislation/regulation at the level of the state. Such interventions are clearly only a piece of a wide ranging set of initiatives to be undertaken by numerous actors – from food chain firms to individual eaters – but our reading is that more attention has recently been paid to private firm than regulatory changes. We hope to redress this to some degree in this article.

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Key words: food waste, Canada, waste management hierarchies, energy inefficiency

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Introduction

In this paper, we proposed solutions to Canada's food waste problem. Since the early days of the Food and Agriculture Organization (FAO), global pressure has been exerted on the food system to increase production. This has conveniently dovetailed with capitalist growth expectations and complied with an international agriculture research agenda, most famously exposited by the work surrounding the Green Revolution. But a significant consequence of this drive to increase output is that much of it is wasted. As such, food waste is the Achilles Heel of the modern food system, revealing many of its structural weaknesses. Contrary to the food system's efficiency rhetoric, it is actually highly inefficient from the perspective of resources consumed, pollution (including GHG emissions) and food insecurity.

In earlier efforts to govern global food, such inefficiencies were on the radar. Parfitt et al. (2010) outline how post-harvest losses, a key element of the waste story, were originally a big part of the FAO mandate. Despite this early preoccupation, almost no research was conducted on reducing widespread post-harvest losses in the 1990s. The FAO had only one small office

addressing post-harvest losses, miniscule compared to the institutional resources for yield improvement (Smil, 2004). Only recently has the FAO recaptured an interest in such matters, having recognized that while one-third of food is wasted or lost, 870 million people experience malnutrition and hunger (Gustavsson, Cederberg, Sonesson, van Otterdijk, & Meybeck, 2011). The 2008 food price shocks also contributed to renewed focus on food waste (Evans, Campbell, & Murcott, 2013).

Although no full accounting of the implications for production have been conducted, Smil (2004) roughly calculated that eliminating staple grain post-harvest losses would save enough food to almost meet the caloric needs of the population of India. Consumers in North America and Europe waste almost as much food each year (222 million tonnes) as the entire net food production of sub-Saharan Africa (230 million tonnes) (United Nations Environment Programme, 2013). Abdulla, Martin, Gooch, and Jovel (2013), examining food waste in Canada, concluded that three adults waste enough in a month to feed a fourth adult. This paper takes as a viable premise that significant state interventions to prevent food waste are warranted by the need to increase food availability, decrease pressures to increase yields, and reduce pollution and resource consumption.

Food waste[1] is a broad term requiring some disaggregation (which we provide below). Direct food waste is only one dimension of the resource waste that characterizes the Canadian food system. Essentially, food waste includes any edible food that is not consumed by humans, and human inedible foods that are not used as animal feed or in industrial processes and composting. Such waste also squanders the resources used to produce, process, transport, store and prepare the food. For example, "one calorie of food saved can result in a sevenfold reduction in the energy use across its lifecycle" (Gooch, Felfel, & Marenick, 2010, p. 91). There are also inefficiencies in the food system, augmenting the waste of the resources on which food production and distribution depends. As we discuss in this paper, land is used inefficiently, energy input / output ratios regarding food production vs consumption are poor, animal feeding regimes compete with human edible foods, cooling and heating systems are energy inefficient, and food is consumed in excess of biological requirements (luxus consumption), leading to health problems that individuals and the state pay for in lost productivity and health care expenditures.

While there has been some recent progress reducing direct food waste, often undertaken by private firms (see Uzea, Gooch, & Sparling, 2014 for Canadian examples), no effective initiatives have been put in place that reduce overproduction and overconsumption (Smil, 2004). Unfortunately, much of what has recently been implemented is misdirected or ineffective given

[1] Some analysts distinguish food loss from food waste. In this categorization, food loss refers to a decrease in food quantity or quality of edible food mass throughout the part of the supply chain that specifically leads to edible food for human consumption. It occurs during the production, post-harvest and processing stages in the food supply chain. Food waste, on the other hand, refers to a subset of food loss that occurs specifically at later stages in the food supply chain, primarily retail and final consumption (Parfitt et al., 2010). However, we do not employ this distinction as it implies that the forces creating food loss are largely beyond our control which is inaccurate (Gille, 2013). We elaborate on this below.

the scale of the problem, a theme we return to later in the paper. This situation exists despite the general recognition that food waste creates negative economic, environmental, and social impacts. The straight economic value of wasted food globally and in Canada represents an annual loss of $750 billion and $31 billion per year[2], respectively (Gooch et al., 2010; Gooch and Felfel, 2014; Gustavsson et al., 2011), but Gooch and Felfel (2014) estimated that the embedded value of Canadian food waste is actually around $107 billion / year because of all the other inputs wasted. Food that is wasted globally is responsible for the release of 3.3 billion tonnes of greenhouse gases into the atmosphere and a global water loss of 675 trillion litres per year (Miller, 2012). In the U.S. alone, the energy contained in wasted food represents approximately two percent of national annual energy consumption (Cuellar & Webber, 2010). Additionally, 1.4 billion hectares of land, or 28% of the world's agricultural area, is used annually to produce food that is wasted (FAO, 2013). There is also recognition of the significant social implications of food waste.

> On 19 January 2012, the European Parliament passed a resolution to tackle food waste and called on the European Commission (EC) to halve current volumes of food waste by 2025 (EC estimates suggest 90 million tonnes are produced annually in the EU). Significantly, in the discussions surrounding these movements the emphasis is on the perversity of wasting food when more than 70 million people in the EU live below the poverty line and 16 million depend on food aid to stave off malnutrition. Here, therefore, we see food waste tied intimately to food poverty. (Evans et al., 2013, p. 18)

Although there is significant imprecision in food waste estimates, by any measure they are enormous and shocking[3]. The most frequently cited study, the FAO's Global Food Losses and Food Waste, estimates that roughly one-third, or 1.3 billion tons per year, of edible parts of food produced for human consumption are wasted globally (Gustavsson et al., 2011). Research to date mostly focuses on avoidable (e.g., bruised fruits, leftovers), rather than unavoidable (e.g., bone, fruit pits) food waste (Gooch et al., 2010), so by the approach taken here, the estimates would be even higher. Indeed, total food waste may be as high as 50% of everything that starts out on a farm, with the U.S. being one country where levels may be this high (Stuart, 2009).

[2] Gooch et al. (2010, p. 2) noted that the quantifiable amount of food waste represents "terminal food waste". Gooch & Felfel's revised estimates (2014) were based on new data on waste in sectors not previously accounted for, particularly seafood capture to processing, institutions and international catering.

[3] A range of methodological approaches has been used to examine food waste, including: archaeological excavations of landfills (Harrison, Rathje, & Huges, 1975; Rathje & Murphy, 1992); applying loss assumptions to national estimates of food supplies (Economic Research Service, 2011; Buzby & Hyman, 2012); household waste composition studies (WRAP U.K., 2011); structured interviews, and many others. The varieties of methodological approaches combined with differing interpretations of food waste conflate estimates across countries and make identifying trends more challenging. To date, the majority of food waste research is conducted in industrialized countries and tends to explore the changing roles and preferences of retailers and consumers (Griffin, Sobal, & Lyson, 2009).

Patterns of food waste differ between developing countries and industrialized countries. Higher incidences of production, distribution and storage losses are characteristic of developing countries, whereas industrialized countries generate much higher levels of food waste at the retail and consumer ends of the supply chain (Parfitt, Barthel, & Macnaughton, 2010).

Our method to identify solutions is described in more detail below, but essentially we follow a normative approach as broadly outlined by MacRae and Winfield (2016). Consistent with that approach, the primary analytical lenses are the main three frames of social science research on food waste: political economy; the 'cultural turn' (the cultures, ideologies and politics of food and consumption); and what some call post-humanism (food as "lively stuff" with many non-human actors) (Alexander, Gregson, & Gille, 2013) and others describe as political ecology. We filtered data from primary interviews and secondary sources through these lenses to identify problems and solutions. In the course of our collective research on food waste, we interviewed over 35 employees of food chain firms and organizations, including 10 middle to senior managers in food retail, and 2 farmers (for details, see Kohn, 2011; Siu, 2015; Perreault, 2016). One co-author, as part of this and affiliated work (see McCallum et al., 2014), toured distribution facilities and stores of a major Canadian retailer, had access to the Company's head office staff, held group and one-on-one interviews with staff in a variety of capacities, and was granted access to confidential corporate reports. Another co-author volunteered with a food recovery organization and spoke with their operational staff. Operational frameworks that helped us assess the merits of different food waste reduction strategies are provided in the Solutions section of the paper.

Our focus is on comprehensive and integrated changes to policies, programmes and legislation/regulation at the level of the state. Such interventions are clearly only a piece of a wide ranging set of initiatives to be undertaken by numerous actors – from food chain firms to individual eaters – but our reading is that more attention has recently been paid to private firm than regulatory changes[4]. We hope to redress this to some degree in this article with a focus on Canada. Since much of the regulatory authority for food waste lies at the provincial and municipal levels, we present Ontario as an example of the changes required across all three levels of governance. In identifying solutions, we draw on examples from other jurisdictions where measures to counter food waste are more advanced, and where appropriate, attempt to adapt them to the Canadian context. We employ a non-traditional structure in presenting our analysis, with data from document reviews and interviews interwoven in our narrative of food system inefficiencies, causal forces, and solutions. In attempting to cover the vast array of issues connected to food waste, we recognize that our analysis is cursory in places and at times uneven, but the absence of a comprehensive and joined up discussion is the motivation for this effort.

[4] For example, the work of WRAP in the UK focuses particularly on the private sector, although the organization does receive government funding.

General data on food waste in Canada

Data help identify strategic interventions, but only a few national studies examine food waste. According to Statistics Canada (2009), about 38%, or 183 kg per person, of the solid food available for retail sale was wasted in 2007. Food losses from retail to household amounted to about 6 million tonnes of food waste (Statistics Canada, 2009:39). The number of calories available per person in 2007 was 3,384 kilocalories; however, only 71% of the calories purchased were consumed, leaving 29% of the calories produced to go to waste (Statistics Canada, 2009:40). The Gooch et al. (2010) study has provided the most commonly referred to estimate of food waste within Canada's agri-food sector. They concluded that approximately 40% of food produced in Canada is not consumed, representing a lost value of $27 billion annually, later revised to $31 billion (Gooch and Felfel, 2014). With around $48.7 billion in sales of agricultural products in 2009, this means that 55% of food is wasted from farm to fork, as measured against sales (Gooch et al., 2010:16).

Working from the Gooch et al. (2010) report[5], Abdulla et al. (2013) identified waste as a percentage of food available for consumption across a 49-year period for different food categories (see Table 1). This included both edible and inedible waste, but is believed to be a conservative estimate because it is impossible to account for all farm, distribution and processing waste.

Table 1: Average % food waste of available food for consumption, 1961 to 2009 (adapted from Abdulla et al., 2013)

Food category	% food waste of available food for consumption
Total fresh fruit	46.19
Total fruit	66.93
Total fresh vegetable	49.91
Total vegetable	42.66
Total dairy products	27.57
Eggs	20.94
Red meat, boneless weight	39.73
Poultry, boneless weight	42.74
Total fish (1988 to 2009)	31.21
Total oil and fats	29.18
Total cereal products	30.00
Total pulses and nuts	15.40
Total sugars and syrups	28.80
Total waste per person per year	44.11

[5] Note that the 2014 update did not substantially change percentages.

From their analysis, 44% of food available for consumption is wasted / person / year, with fruits, vegetables and poultry the most wasted and pulses and nuts the least.

A few regional studies have been undertaken. For example, Parizeau, von Massow, and Martin (2015) found 20% higher levels in a community in Guelph, Ontario than the Statistics Canada study, though the reasons for the higher results are not obvious. Peel Region in Ontario found, in recent curbside audits, that 40% of household food waste was avoidable, with 53% coming from leftovers that could have been eaten, and 47% from untouched food (Peel Region, 2016). A 2014 Metro Vancouver study found that the typical resident purchases too much food and a significant amount goes bad before it can be consumed. Of the avoidable and edible portions, Metro Vancouver wastes 30,000 eggs, 70,000 cups of milk, and 80,000 potatoes every day (Metro Vancouver, n.d.). Many local firms, institutions and facilities have also carried out food waste audits and interventions that we do not report on here.

A brief overview of major forces contributing to food waste

Of the available information, studies on the industrial world unanimously conclude that the largest and second-largest contributors to food waste are consumers and retailers, respectively (Griffin et al., 2009; Gooch et al., 2010; Hodges, Buzby, & Bennett, 2011; Waste and Resources Action Programme U.K., 2011). But such high levels of waste in the industrial world are a relatively recent phenomenon[6]. Parfitt et al. (2010), for example, cite studies on the changes at the U.K. household level, from one to three percent pre-World War II to 25% of current purchases (by weight). Abdulla et al. (2013) concluded that total food waste per capita in Canada increased 40% from 1961 to 2009, which outpaced increases in food availability over the same period. The United Nations Environment Program (2013) concluded that if current rates of food waste continue, by 2050 the world would need 60% more calories than in 2006. Reducing waste by 50% would reduce calorie demand by 20%.

A range of explanations for this type of shift - cultural, political, structural and logistical - have been put forward and we briefly review them here and return to some of these themes when putting forward our proposals for change. Gidwani and Reddy (2011) argue that early British notions of liberalism (and property) were entirely connected to discourses of the time about waste. The British political philosopher John Locke, whose ideas underpin much of political liberalism, positioned the commons as waste. “The theme of nature as bountiful yet wasteful, unless properly harnessed by application of human labor, is a powerful undercurrent in Locke’s theory” (p. 1633). Put another way, Nature was profligate so it needed to be controlled. But, given the period’s lack of ecological literacy, the controls imposed were entirely unecological in their design. Consequently, they actually generated more and different kinds of waste since waste, as humans have constructed it, does not exist in natural systems.

[6] Of course, waste in pre-industrial periods would have a different character than the current profile.

The current waste problem is in part the wider story of rural-urban antagonism within capitalism (Foster & Magdoff, 1998, Foster, 1999; Friedmann, 2000; Moore 2000, 2011; Clark & York, 2008; Schneider & McMichael, 2010). Marx's theory of metabolic rift explains such antagonism as the separation of social production from its natural biological base, tangibly seen in the separation of production from consumption and the marked division of labour between town and country (Foster & Magdoff, 1998; Friedmann, 2000; Moore, 2000). The metabolic rift framework helps explain the link between problems of soil infertility and environmental degradation and increasingly long-distance global agricultural trade (Schneider & McMichael, 2010).

In Marx's conception, the mechanism of the metabolic rift is the movement of soil nutrients—in the form of grain or other fruits of the land—to towns, where they end up in urban sewage and in the environment as human organic waste (or "humanure"), which should, but typically does not, go back to re-fertilize the land (Foster & Magdoff, 1998, Foster, 1999; Schneider & McMichael, 2010). When people are removed from the land (e.g. migrate to the cities), the "humanure" goes away too, thus breaking the human-nature-metabolic cycle. The urban "Sanitation Revolution", while markedly improving public health, also cemented the separation of humanure from production (Ashley, Cordell, & Mavinic, 2011). Marx focused only on soil as matter, ignoring that soil is indeed a living organism, with health and fertility dependent on a complex soil food web and metabolic reactions between living and non-living components (Schneider & McMichael, 2010). However, our more current understanding of soil reinforces Marx's basic concept.

Friedmann (2000), elaborating on some of her earlier food regime work (Friedmann & McMichael, 1989), shows how the mobility of capital, labour and global outsourcing, resulting from world markets, disrupts the material cycles of local ecosystems (including food nutrient cycles). She highlights that during the nineteenth century, the transformation of local ecologies was not only caused by the trade of food commodities, but also by the arrival of new settlers. New settlers bring cultural diets and farming practices which, once they interact with species invasions and global trade, amplify the vicious circle of dependence on export-oriented agricultural models. This socio-cultural dimension enhances the disruption of local agro-ecosystems linked with global trade and together these phenomena deepen the metabolic rift.

During the second food regime[7] (Friedmann & McMichael, 1989), governments heavily subsidized production with little attention to who would consume the outputs. This triggered another wave of subsidy interventions to find customers for the increased production. Such interventions were consistent with conceptions of a golden era of agricultural science and technology development. They contributed to the era of cheap and excess food on a global scale

[7] To this point, three regimes have been documented. The first had its stable period from 1870 to 1917, the second one, between1947 and 1973, and a third one has supposedly been running since the late 1980s. The characteristics and nature of the third food regime have been the subject of a large, still ongoing, debate (McMichael, 2005; Friedmann, 2005, 2009; Burch & Lawrence, 2009; Campbell, 2009; Holt-Gimenez & Shattuck, 2011).

(though not necessarily within every locality). All of this became elements of what we now know as the modern industrial food system[8], which was consolidated during this second food regime.

Relatively low food prices (compared to earlier historical periods) are also thought to be an important cause of food waste (Rutten, 2013). Particularly for consumers, the relatively low cost of food may prevent taking action. Scarcity, and the associated high cost of wasting food, either in dollar or human resource terms, has historically been a prime force for waste minimization. Now, for agri-food producers and suppliers, it may be better to allow for some food losses at a relatively low cost, rather than take measures to combat it for a seemingly relatively high cost and low returns (Prasada, Bredahl, & Wigle, 2010). The low price of food is partly a product of surplus, but also a product of cost externalization. Neither producers nor consumers are paying the real price, as consequences are externalized to health care and environmental degradation (cf. Tegtmeier & Duffy, 2004). Certainly, one externalized cost is food waste disposal itself, that the fees charged are so low relative to the impacts on the environment and the lost opportunities for use. Government subsidies to energy and waste management contribute to food cost externalization because they appear to make food cheaper.

Coming back to the food regime discussion above, a large body of literature focuses on the growing power held by a limited number of agri-food manufacturers and supermarket chains throughout the global food system. Some scholars have identified this phenomenon as an emerging third food regime, the corporate food regime (Burch & Lawrence, 2009; McMichael, 2009; Holt-Giminez & Shattuck, 2011). Due to their exceptional buying power, food retailers now strongly influence other actors along the food supply chain, which may further affect the generation of food waste (Richards, Bjørkhaug, Lawrence, & Hickman, 2013). Such retailer practices include unnecessary inventory, excessive transportation, lack of coordination along the chain, and high quality standards (Gooch et al., 2010; ERS, 2011; Mena, Adenso-Diaz, & Yurt, 2011). Quality standards can readily be an instrument of economic power as retailers will change them depending on levels of production (Gille, 2013). They can also be used to shift risk to those with less economic power, typically farmers and small suppliers (cf. Campbell, 2002). Both Stuart (2009) and Bloom (2011) identify perverse incentives in the system that result from these power relations, for example, that retailers do not necessarily plan their orders well as, in many cases, produce remaining on shelves is returned unpaid to the producer.

These relations permit supermarkets and general merchandisers selling food to not only waste food at their stores and distribution centres (DCs), but also cause food waste upstream in the supply chain and downstream among consumers. Competitive relations create a lack of coordination among the different actors in the food supply chain and disconnects between the chain and consumers. Manufacturers waste food because of their agreements with retail chains, often overproducing to fulfil retailer demands. Farmers waste food in an effort to provide retailers all year long with the highest cosmetic standards, as part of their efforts to remain competitive. Poor demand forecasting, overproduction, inefficient management policies and

[8] Later in this paper, we will provide a fuller explanation of how food waste is generated within the industrial food system.

practices, and attitudes towards fresh food all contribute to food waste at the supermarket level (for more details on these phenomena, see the discussion in the next section).

Perversely, certain well established processes that appear to reduce waste may actually contribute to it or have less of a positive impact than presumed. O'Brien (2013, p. 202) captures this problem in the observation that, "contemporary policy simply construes the discarding as a link in the chain of surplus management." In this sense, the lines are blurred between surplus and waste. Midgley (2013) argues that secondary markets in surplus food, such as food banks, are designed to protect primary markets, by providing outlet for lower quality goods and ultimately helping to regulate prices.

Equally difficult, the efforts of one part of the supply chain create challenges for other parts. Under current food system conditions, reducing food waste on the demand side will have mixed outcomes regarding overall welfare of agri-food firms. For consumers, reducing individual food waste is generally beneficial as less money is spent on food purchases. Conversely, reducing consumer food waste may not be in the best interests of agri-food producers and suppliers as there is reduced demand for food products. However, producer and supplier welfare may not necessarily decline if consumers are using saved expenses for the consumption of other higher end commodities (Rutten, 2013)[9].Typically, as food waste reduction strategies are only measured against a cost-benefit ratio, consideration for the distribution of welfare and larger ecological impacts are omitted (Parks & Gowdy, 2013).

Consumer food waste is often attributed to behavioural responses that may be facilitated in part by the structure of food retailing and manufacturing (e.g. packaging sizes, one-stop stock-up trips, supermarket locations). Some other identified causes of consumer food waste include high aesthetic standards for produce, cooking/preparing too much, not using the food in time, and a lack of confidence using leftovers (Gooch et al., 2010). Some studies (Jaffe & Gertler, 2006) partly ascribe the rise in food waste to consumer deskilling, which refers to the intentional and unintentional loss of basic food knowledge, such as proper food handling, storage, and preparation. As Evans (2012, p. 12) showed from his ethnographic work with south Manchester U.K. householders, food waste emerges from the intersection of "time, tastes, conventions, family relations and domestic divisions of labour' within 'the material context...of domestic technologies, infrastructures of provision and the materiality properties of food itself". Watson and Meah (2013, p. 116) put it another way: "Food waste is in this way the fallout of the organization of everyday life. The location of practices of household food provisioning within broader patterns and rhythms through which everyday life is accomplished can easily work to displace enactment of concerns to avoid waste."

We return to these themes later in the paper when discussing the framing of food waste interventions and the types of solutions consistent with that framing.

[9] Since we can only eat so much food, saving money on waste reduction does not necessarily mean buying more food with it, but possibly buying different kinds of foods. But this involves a substitution that might, in a cascading way, result in other producers suffering.

Waste in the industrial food system: A fuller description

In this section, we provide some summary descriptions of waste in the modern industrial food system. This sets the stage for our later discussion of priority strategies for redesigning food systems. Unfortunately, while it is possible to qualitatively describe multiple aspects of waste, in many cases, there are limited data available to provide a more robust understanding of it.

Land use waste (from MacRae, Lynch, & Martin, 2010)

It used to be that farmers would adapt cropping and livestock production to soil and climatic conditions. Now they use chemical fertilizers, pesticides and irrigation to "compensate" for biotic and abiotic deficiencies, often unsuccessfully. The consequence is that soil quality is not necessarily well matched to crop production practices that minimize resource expenditure. Related to this, crop and animal production are often separated (sometimes referred to as stockless systems and factory farming) and nutrients from animal manure are squandered, because there is insufficient cropping to optimize use and transporting nutrients to other farms is too expensive.

In Canada, farming is considered a private sector activity governed by private property rights. Consequently, there is limited landscape level planning and execution to ensure that cropping and animal production reflect the ecological realities of a region. Such planning is more complex than just matching crops to soil types. Some degree of specialization (within the bounds of system rotation and diversity requirements) might occur based on landscape features and farmer collaboration (e.g., sharing land to create suitable rotational crop patterns and building on landscape integrity). Of course, the competition with other land uses, particularly urbanization, makes such planning more complicated. However, many urban areas also have land that could be used for food production, especially if such production is organized to avoid competition with peri-urban producers.

An undetermined, but significant, amount of high quality land area is devoted to non-food uses, including tobacco, floriculture, landscaping plants, horse racing, and crops for beverage production. Many of such lands may be better suited to food crops, with non-food crop production shifted to less valued locations.

Nutrient inefficiencies (from MacRae et al., 2010)

The shift to synthetic nutrient sources from biological ones creates new inefficiencies in nutrient use and the energy expended to produce them. This is particularly acute for nitrogen, the most energy expensive of the main crop nutrients. For example, N use efficiency of cereals decreased globally from 80% in 1960 to about 30% in 2000 because of inefficiencies related to synthetic N utilization (Erisman, Sutton, Galloway, Klimont, & Winiwarter, 2008). Green manure nitrogen

recovery is typically much higher than synthetic N (70 to 90% vs. 30 to 50%) but is spread out over much longer time horizons with usually only five to ten percent available in the first following crop (Crew & Peoples, 2005). Consequently, it requires more sophisticated management and seems "inconvenient" relative to synthetic N.

Regarding plant varieties, the focus in plant breeding on high optimal harvest index may reduce overall system efficiencies associated with the plant, and increase off-farm export of nutrients. Farming systems that make better use of the non-human edible parts of the plant – either for organic matter, for animal feed, for bedding, or for weed management (taller, more competitive plants with lower nitrogen requirements) – is desirable.

Water waste

As discussed above, animals, crops and rotations are not usually selected for the prevailing moisture conditions; thus, irrigation is often required. This is problematic for food crops, but even more so for irrigation of exotics and non-edibles destined for export markets. Irrigation systems are not very efficient, frequently with poor timing and targeting, inefficient distribution and pumps. Around 70% of water use in the world is for irrigation, therefore with food waste, a great deal of water is used ineffectively (Cuellar & Webber, 2010).

Processing also contributes to water waste. In 2005, the Canadian Food and Beverage Industry (FBI) accounted for about 20% of all water withdrawals of manufacturers. Of this, 77% of water taken was discharged, 19% was incorporated into product, waste sludge and solid waste, or evaporated and only four percent was reused (Maxime, Arcand, Landry, & Marotte, 2010).

The amount of water used each year to grow and produced lost and wasted food would fill 70 million Olympic-sized swimming pools (UNEP, 2013a). U.K. food waste used six percent of the U.K.'s water requirements and nearly twice annual household water use (WRAP U.K., 2011).

Solar inefficiencies

Modern agriculture is designed around annual plants instead of the generally more energetically efficient perennials. And most of the annuals are C3 plants, rather than the more optimal C4s[10]. The C4s used are typically highly mismanaged in energy terms. Additionally, many fields are not properly oriented for solar capture and structures to capture solar energy are poorly designed, e.g., greenhouses.

As energy is always lost the more consumption stages it passes through, eating closer to the sun definitely helps with overall system energy efficiency. When humans consume products from animals that are fed crops humans can consume, or on land that can appropriately be

[10] C3 and C4 refer to the metabolic pathways of carbon fixation in photosynthesis. Fewer plants are C4 and in evolutionary terms are likely more recent developments. C4 fixation is thought to be more metabolically efficient than C3.

devoted to human food crops, energy and land use efficiencies decrease. In contrast, efficiencies tend to increase when animals are fed plant matter that humans cannot digest (including crop residues), on land better suited to pasture than field and horticultural crops (MacRae et al., 2010).

Metabolic inefficiencies (Smil, 2001)

North American agriculture focuses excessively on large animals that are metabolically inefficient. Cattle are very popular in North America, but pigs have 40% lower energy requirements than would be anticipated from their size, largely because of low basal metabolism. Cattle have much higher basal and reproductive metabolism, although dairy animals have a favorable conversion ratio for milk. Pigs also tolerate a wider range of environments. Chicken and eggs are next on the energy conversion scale, suggesting they warrant more attention in landscape level planning for energy efficiency. Ultimately, fish are much more efficient feed converters than farm livestock, so it makes sense to devote more attention to ecological herbivorous and omnivorous fish systems in the longer term.

To optimize both human and animal feeding systems, ruminants should eat primarily forages/grass and monogastrics residues and seeds (other than the dominant crop seeds). Other countries have more appropriate balances. For example, only five percent of human edible grains are fed to livestock in India compared to 60% in the U.S. Crop residues and wastes, feed oil seed crush, processing residues, and lower quality feed grade crops should be more effectively used for livestock. As well, pasturing hogs and poultry is feasible as part of the diet (Honeyman, 2005). Reducing feed losses will improve overall system efficiency. Additionally, animals fed such a diet tend to be leaner. The U.K. Institute of Grocery Distributors (IGD) and the Lean Enterprise Research Centre (LERC) found, for red meat production, that producers were feeding animals until they were overly fat. This is not only a waste of feed, but also costs processors who have to put resources into trimming off unnecessary fat (Gooch et al., 2010).

In the dominant production models, animal are typically raised in environments that are not conducive to their innate behaviours and this typically requires more energy to sustain them. For example, many beef cattle breeds are bred for primarily outdoor living and do not require barns. Pigs do well in more open structures such as hoop houses and open air sheds (Honeyman, 2005). Such systems have lower energy use associated with the structure, and may have lower overall energy use depending on the feeding regime (the biggest consumer of energy in hog systems) (Honeyman & Lammers, 2011).

Human overconsumption (luxus consumption)

Smil (2004, p. 22) observes from a population level perspective on biological calorie requirements vs. current consumption that,

> weighted means for entire populations are rarely above 2,000 kcal/person. This means that per capita gaps between average availability and actual consumption are now greater than 1,000 kcal/day in every high-income country, with maxima approaching, or even surpassing, 1500 kcal/day. In order to account for inevitable food losses and to provide an adequate safety margin the average per capita food supply should be 30% above the needed mean of 2,000 kcal/capita, averaging no more than about 2,600 kcal/capita.
>
> In his view, proper allocation of calories would feed an additional 350 million people.

Supply chain waste

Waste happens in multiple ways along the supply chain and for multiple reasons.

Farm products - Field losses in Canada were estimated by Gooch et al. (2010) to be nine percent of total waste. As discussed earlier, nutritious and safe food does not necessarily leave the farm, for a number of reasons including: cosmetic requirements[11] that do not make it worth harvesting; harvesting inefficiencies (human or machine); low prices; and losses during on-farm primary processing and storage. Given levels of field waste, significant amounts of food degrade on the field surface in ways that are suboptimal for nutrient uptake by subsequent crops. Food that is harvested and then rejected is often left in cull piles and not composted or fed to animals. Farmers often do not have room in their packing house for lower grade products. An Ontario produce farmer, speaking prior to Ontario's changes to the produce grading system, argued that, "even though the Canada No. 2 grade could be sent to processors or manufacturers, we don't usually bring them out of the field." Processing prices are typically substantially below fresh market prices and farmers usually need an advance contract with processors to make the secondary product supply chain work; that is, they cannot necessarily sell product to processors that was grown for the fresh market but failed to meet the standard. On top of this, the standard boxes used to ship produce can only accommodate a certain size in order to meet quantity descriptions on the box, thereby providing a further incentive to leave food in the field (Schneider, 2008). When a producer does have a contract directly with a retailer, those specifications are usually more exacting than government grading standards. A major Canadian retailer executive stated that, "we don't accept those [government] standards because they're minimum standards. What we do is create our own quality standards, which we call quality specification." For instance, this retailer has about 850 quality specifications for their fruits and vegetables alone (personal communication, senior food retail executive, February 17, 2011).

[11] Note that some provinces, including Ontario, have largely eliminated vegetable and fruit grading standards.

Processing and packaging - Nutritious food is lost during processing for several reasons. It may be deemed unsuitable, the food may be substantially trimmed to suit the process, the batch can be lost due to errors, motion inefficiencies can damage the batch, too much was purchased for demand, or pre- and post- processing storage was ineffective. Gooch et al. (2010) estimated packaging / processing waste at 18% of total food waste, but how much is edible and results from errors and process inefficiencies is not clear. From their discussions with Canadian processors, they concluded that 10 to 40% of the products handled at the processing stage are wasted. The Québec Ministry of Agriculture, Fisheries and Food estimated that between one-fifth and half of the industry's food waste was fit for consumption in 2012 (Fortin, 2014).

Non-perishable food packaging errors occur during the manufacturing process. A significant percentage of this product ends up in the charitable food system, so some of it is consumed. However, food banks are sometimes subsequently forced to dispose of the donated goods, but how much waste this generates is difficult to determine. There is some evidence that the charitable system makes it more feasible for manufacturers to donate (and often receive tax donation credits) than to repackage the goods (Midgely, 2013).

Distribution and shipping - The sometimes convoluted movement of food within a region likely increases the gap between harvest and store purchase. Losses during the shipment of fresh goods from farm to retail, especially with refrigerated, long distance hauls, can result in load rejections at retail or culled pallets. An interview with a senior executive at a major Canadian retailer revealed that in the late 2000s the company was rejecting 75 truckloads of produce per week at the distribution centres (DCs) across Canada that amounted to about 2,722 tonnes a week or 141,570 tonnes a year. This did not include what the retail stores rejected from the DCs. McCallum et al. (2014) provide details on the supply chain challenges facing major retailers as it relates to wasted produce. The buyer protocols can also create waste in the meat sector. Waste along the chain due to inconsistency in carcass composition and production adds an estimated 10% to the end price as meat not meeting specifications is rejected somewhere along the chain (Gooch et al., 2010). Gooch et al. (2010) estimate distribution losses at three percent of total food waste in Canada.

Cooling - Problems with cooling infrastructure along the supply chain (from farm to home fridge) leads to waste. The perishable food system runs on cooling and freezing and a significant percentage of the cooling units have been old (Garnett, 2006). The opportunities for failures, resulting in lost food, are significant. As well, not all horticultural producers can afford sophisticated field chilling equipment. Pre-cooling acts to remove the heat stored in produce from the field. This affects particularly local growers who do not usually have the resources to field chill their produce prior to shipping. Product immediately loses shelf life, and without being able to move local food quickly, retailers risk serious losses.

Retail - Buyers often misforecast requirements (Karolefski, 2015) and then reduce orders when conditions suddenly change, leaving the suppliers without a sale (McCallum et al., 2014). This occurs because retail buyers typically have more economic clout than suppliers and contracts shift economic risks to the weaker actors in the supply chain. Alternately, retailers may be afraid of shorting so they over-order. The amount of available food per person in retail stores has increased during the last decades (Gustavsson et al., 2011). The appearance of abundance is believed to be attractive to consumers, thus increasing sales in the long-term, even if it generates waste in the short-term (Gunders, 2012). Constant stock rotation, however, promotes waste as discerning consumers favour newly stocked produce over those that are close to expiry (Gustavvson et al., 2011). Overstocking can also lead to over-handling by both staff and customers, which may damage items and add to waste generation (Gunders, 2012). Alternately, buyers may focus on "deals" from international suppliers, and purchase at volumes to make the deal happen, even if it doesn't line up with demand (Mena et al., 2011).

From retail document analysis and interviews conducted by our team, we estimated total in-store shrink (including waste and theft) by Canadian retailers (Table 2)[12].

Table 2: Estimated shrink levels for different product categories in supermarkets (adapted from Kohn, 2011)

Department	**Shrink levels** (%)
Produce	8 to 11
Bakery	10 to 12
Grocery	0.5
Meat	3 to 4
Deli	6
Meal solutions	8

On average, a typical supermarket's targeted shrink is six and one-half to seven percent of everything that gets purchased for sale. Reducing shrink from nine to seven percent would represent a significant reduction and make a huge difference to the bottom-line. To limit shrink, a store must counteract prominent driving forces for freshness and quality at a low price.

Restaurant - Gooch et al. (2010) estimated that restaurant/food service waste represents eight percent of total Canadian food system waste. In U.S. restaurants, diners wasted nine percent of the meals they bought, partly because of increased serving sizes (Lipinski, Hanson, Waite, Lomax, Kitinoja, & Searchinger, 2013). Since the 1970s, there have been significant increases in portion sizes in the U.S. (Nielsen & Popkin, 2003). For example, the Centers for Disease Control (CDC) documented two and one-half to four fold increases in serving size for certain popular fast food items between the 1950s and the present day (CDC, n.d.), the average pizza slice has

[12] Note that in our studies, retailers were very reluctant to provide precise figures on shrink, so we were forced to estimate from secondary sources.

increased by 70% in calories and the average muffin has more than doubled in calories. Portion sizes served in restaurants and other food service establishments can range from two to eight times larger than the USDA's recommended standard serving sizes (Regional Municipality of York, 2013). This appears to have carried over into Canada as well, though data are less available.

WRAP U.K. found in a survey of a range of food service operations that 21% of food service waste is from spoilage, 45% is from food preparation and 34% from plate waste. Different types of restaurants show different profiles, for example, there is lower plate waste in fine dining establishments and higher waste from kitchen prep, while restaurants without sit-down have contrasting ratios (Williams, Leach, Christensen, Armstrong, Perrin, Hawkins et al., 2011). In many restaurants, a lack of trained chefs and fixed menus can limit capacity to adapt to excess inventory, whereas restaurants with skilled chefs and weekly menu changes are less likely to waste food. In fact, the reduced waste is part of how some keep prices affordable (Rosenblatt, 2009). The FAO report (Gustavvson et al. 2011) noted that certain kinds of procurement practices mean that more food preparation happens off-site so the waste is generated elsewhere in the supply chain (in North America, suppliers to food service such as Sysco). A detailed analysis of profit-making hospitality operations found that, "two-thirds of the food that was thrown away could have been eaten if it had been better portioned, managed, stored and/or prepared, with the remaining one-third consisting of items that are 'unavoidable waste' as they are not usually consumed (e.g. banana skins, vegetable peelings)" (Williams et al., 2011, p. 4).

Consumer – Food waste in the home includes uneaten food in the refrigerator, plate waste and liquids poured down the drain. Gooch et al (2010) estimated that 51% of waste is generated in the home, revised to 47% in their follow up work because of the addition of higher waste estimates in earlier stages of the supply chain (Gooch & Felfel, 2014). In their study of U.K. food waste, Quested and Johnson (2009) concluded that 64% was avoidable edible waste, over half of which was not consumed in time and 41% was a result of over-serving. Another 18% was potentially avoidable, depending on family consumption patterns and only 18% was inedible, requiring consumption by other organisms or composting. Following a 2014 audit, Metro Vancouver concluded that over 50% of the food being wasted was avoidable (Metro Vancouver, n.d.).

However, as discussed earlier, structural dimensions across the supply chain contribute to food waste in the home, particularly phenomena such as the weekly stock-up trip (often associated with poor urban planning that positions large stores at some distance from neighbourhoods), store promotions that encourage overbuying, the failure to carry small unit sizes, confusing date labelling, store designs that encourage impulse buying (Ontario Public Interest Research Group, 1990) and consumer deskilling (Jaffe & Gertler, 2006). Certainly consumer behaviours contribute to the situation (Parfitt et al., 2010), but resolving them is not just a question of consumer education as many propose.

Nutrient recovery - Nutrients are lost because of inefficient recovery from compost and sewage sludge. “In Canada, approximately 30-40% of all municipal solid waste is composed of organic material...and upwards of 25% of residential solid waste may be food waste.” (Forkes, 2011, p 62) Many regions do not have backyard, residential curbside or commercial composting programmes. Those that do, often have inefficient composting processes, with losses and poor quality end-product that is not used for food production. Regarding human waste, we excrete up to 90% of the total protein consumed. “Lind et al. (2001) estimated that the recycling of nutrients present in domestic wastes could replace 35-45% of fertilizers needs, 20-25% from the recycling of nitrogen in urine alone.” (Forkes, 2011, p. 63) Only about 20% of mined phosphate rock actually makes it to our food, with urine and feces losses a significant part of the inefficiency (Ashley et al., 2011). Unfortunately, most municipal sewage is contaminated with industrial materials and cannot be applied safely to farmland (although the practice continues). As a result, incineration, composting and landfill are the most common alternative disposal methods.

Clearly, waste is extensive across the entire food system with many structural processes responsible for the current deficiencies. There are, however, many possible improvements that we discuss in the next section.

Critical next steps to minimize waste and reduce pressures on yield increases

Food waste reduction frameworks

Waste is on the radar and many firms have been doing positive things. However, much of that effort is misdirected and voluntary, with limited uptake by the actors critical to improving the situation. “[T[he links between the various economic and cultural processes that give rise to waste, [remind] us that it is essential to research food waste as it appears within different national, institutional and regulatory contexts.” (Evans et al., 2013, p. 10) Our strategic approach in this paper, then, is to create a regulatory environment in Canada that supports many of the positive undertakings, but essentially forces most actors to participate in a way that addresses root causes of the problems. This is not to discount the many things that firms and individuals are doing, but the focus here is on interventions involving the state.

This strategic approach is framed by a number of concepts. First, a food chain approach is critical and represents a departure from many earlier approaches that tended to focus on individual sectors (Jackson, Ward, & Russell, 2006). “While the majority of food waste occurs at the consumer level, improving the management of agri-food value chains would have the greatest long-term impact on reducing food waste, and the resulting economic and environmental impacts.”(Gooch et al., 2010, p. 10) Concluded WRAP U.K. (2011a), “the greatest successes so far have come from addressing the whole supply chain collectively, as experience shows that reducing waste in one area may, in fact, create it somewhere else.” Supply chain analysis

provides a clearer picture of various participants and may lead to greater systemic efficiency (Hodges et al., 2011). As Gille (2013, p. 40) argues,

> We need to do two things in our analysis: first, stop conflating the location with the cause of waste; and, secondly, make visible how resource waste and food waste are interconnected.... If we want to find places for intervention, those relations that cross not only geographical and political boundaries but also scales must be analysed. The problem for policy-making, however, is that it is exactly these types of complex and multi-scalar forms of food waste that are the hardest to quantify and therefore the hardest to eliminate....If food loss is caused by non-human factors—weather or pests—the solution is greater mastery over nature: that is, technological innovation. However, if food loss is caused by social arrangements, the solution resides in new institutions and the reorganising of structures leading to systemic loss. My general view is that both accidental/natural and systemic/social causes of food waste must be attended to.

Second, we employ an agroecological interpretation of waste. In such an approach, the food system is a production–consumption–recycle system (Hill, 1985), in which soil organisms play a fundamental role in transforming organic material into energy, nutrients and water that can be used in subsequent production cycles. In this sense, there is no waste, only food for other processes and organisms. Consistent with this, human survival has historically depended on consuming all edibles and using inedibles primarily for other purposes– shelter, clothing, animal feed (essentially a secondary edible use), tools and production, and sometimes heating / cooking fuel. So what hierarchies and instruments encourage optimal utilization of edible food before inedible food goes into secondary processes?

An agroecological approach demands changes to traditional food waste management hierarchies. The European Commission's Waste Hierarchy Directive in 2008 (EC, 2012) (in order from most preferred to least preferred) only partly reflects such ecological principles:

- waste prevention (non-waste)
- preparing for reuse
- recycling
- recovery
- disposal

The U.S. Environmental Protection Agency's (2014) food recovery hierarchy (in order from most preferred to least preferred) is somewhat more reflective of an agroecological approach:

- source reduction: reduce the volume of surplus food generated
- feed hungry people: donate extra food to food banks, soup kitchens and shelters
- feed animals: divert food scraps to animal feed
- industrial uses: provide waste oils for rendering and fuel conservation an dofood scraps for digestion to recover energy
- composting: create a nutrient-rich soil amendment
- landfill/incineration: last resort to disposal

Better frameworks and hierarchies than these are required because otherwise the capitalist drive to surplus accumulation captures food waste as energy or other secondary processes and makes those processes actually more important than ensuring people have access to a nourishing diet. O'Brien (2013) captures this reality well in his story of freegans prosecuted in Europe for stealing an energy resource, that is, food that had already been dumped as waste but was to be collected by a biomass energy producer. Many proposals from industry and government to improve food waste management unfortunately facilitate this drive to surplus accumulation (for an example of such proposals, see Gooch et al., 2010).

To correct for the causal forces identified above, we propose the following hierarchy from which to design regulatory structures and processes (and provide preliminary broad observations on current challenges associated with fulfilling the hierarchy):

- Level 1: Edible food for direct human consumption at minimum resource expenditure. Challenges: tailoring resource quality and quantity to food production; shifting all producers to sustainable practices; redesigning processing to minimize waste generation and maximize resource use efficiencies; sustainable procurement within agrifood firms; demand-supply coordination for edibles, animal feed and secondary processes.
- Level 2: Animal feed (and pet food) without human edibles, but includes human inedibles, such as corn cobs, skins, husks.
  Challenges: removing most human edibles from animal feed which has tremendous implications for animal production; limited number of animal feed processors and distributors able to cycle human inedible food waste to animals, a task more feasible for the farm and processing sectors, but more difficult for retail, restaurants and households.
- Level 3: Human and animal inedibles directed to compost and industrial applications, including waxes, leather and other clothing, chemicals, pharmaceuticals, construction materials, plastics, energy and inputs (e.g., compost).
  Challenges: the need to minimize farmland use for direct energy production unless land quality makes food production impractical; careful targeting of health applications since many plants are essential to the pharmaceutical sector; designing plastics and chemicals from secondary not primary food materials; efficiently using

land for inputs, such as breeding stock and seed. In the case of most farms where energy is produced, it should be consistent with an agroecological approach; that is, it should be a coherent and integrated complement to food produced. If energy crops are planted, the system must be highly efficient, otherwise other measures make more sense in terms of opportunity costs (for more, see MacRae et al. 2010).

- Level 4: Sewage sludge and humanure application to farm land to close nutrient and energy loops.
  Challenges: gap between the potential purity of individual household humanure (assuming the family is healthy and not requiring significant medication) and the end products arising from current residential human waste collection and treatment systems; need to separate residential and industrial sewage and improve sewage treatment processes

Third, we use the Hill and MacRae (1995) Efficiency–Substitution–Redesign[13] framework. This framework serves as both a guide to action, and an indicator of progress. In this framework, Stage one (Efficiency) strategies involve making minor changes to existing practices to help create an environment somewhat more conducive to the desired change. The changes would generally fit within current policy making activities, and would be the fastest to implement and may require minimal additional resources. Second stage (Substitution) strategies focus on the replacement of one practice, characteristic or process by another, or the development of a parallel practice or process in opposition to one identified as inadequate. These typically require more time and resources than Stage one strategies. Finally, third stage (Redesign) strategies are based fully on the principles of ecologies, particularly agroecology, organizational ecology, political ecology and social ecology, and are fully elaborated to address complexity (the earlier stages benefit from an understanding of complexity, but are not in themselves necessarily complex to execute). They take longer to implement and demand fundamental changes in the use of human and physical resources. This final stage, however, is unlikely to be achieved until the first two stages have been attempted. Ideally, strategies should be selected from the first two stages for their ability to inform analysts about redesign (the most underdeveloped stage at this point) and to contribute toward a smooth evolution to the final stage.

A presumption of this framework, then, is that policy change in the Canadian food system is largely evolutionary. It is a longer-term reformist approach, with the dominant structures progressively adapting to policy pressures, ultimately leading to a profound redesign of the food system. Thus, the redesign stage is visionary, but presumes progressive layers of transition leading to its realization. We assume that there are no changes to the Canadian constitution and this limits what and how redesign efforts can be brought to bear. As highlighted later, the

[13] Note that there are many transition frameworks. See MacRae and Winfield (2016) for a review pertinent to food policy themes.

Canadian constitution is a significant brake on food system innovation and we account for that in our proposals.

Using this transition framework, and our proposed food hierarchy, we elaborate below on policy and regulatory initiatives to reduce food waste. To date, the market has proven itself unable to manage food resources consistent with the hierarchy of uses proposed here. Although there have been improvements in food firm behaviour, particularly at the efficiency stage, individual firms will not be able to identify wider structural problems and coordinate changes across firms in order to dramatically reduce food waste. Consequently, there is a significant role for the state, particularly beyond the efficiency stage. For each initiative, we also identify the most significant waste problems addressed (following the description in the previous section, Waste in the Industrial Food System).

Efficiency initiatives

As it relates to food waste, the Efficiency stage is characterized by technological efficiencies, but with attention to O'Brien (2013), excluding initiatives that reinforce capital relations and facilitate capitalist surplus management. Equally important, while this stage can address issues of consumer behaviour, it should do so in a way that does not blame individuals for what are wider structural phenomena.

General

- **Better information on waste and resource inefficiencies**
  Problems addressed: All

With less than five percent of agricultural research funding allocated to post-harvest systems and loss (Parfitt et al., 2010), additional funding from agencies such as the Natural Sciences and Engineering Research Council of Canada and Social Sciences and Humanities Research Council would potentially enhance our understanding of food waste. In addition, definitions of food waste and standards for measurement are required to promote consistency and useful comparisons across studies. Reliable waste estimates and an understanding of the causes are needed to identify where food waste can be efficiently minimized. Policy makers (and private businesses) need reliable information to conduct cost-benefit analyses of specific waste-reducing initiatives (Buzby & Hyman, 2012).

- **Target setting**
  Problems addressed: All

Improved research on food waste permits better goal setting and targeting of initiatives at multiple levels in the policy system.

> In the European Union (EU), the single biggest transition in waste and waste policy is the 1999 Landfill Directive (1999/3/EC); a policy that set out to reduce the negative effects of sending waste to landfill in relation to the environment and human health. This document set legally binding targets to which member states are to adhere...The targets are exceptionally ambitious–not least the obligation to reduce biodegradable waste (the category to which food waste belongs) to 35 per cent of 1995 levels by 2016, or by 2020 for some countries (including the U.K.) (Evans et al., 2013, p. 17).

In the U.K., the existence of this directive produced the Waste and Resources Action Programme (WRAP), an independent non-profit organization with an international reputation for its research, expertise, and advice in a number of areas including food waste reduction. WRAP U.K. sets out to minimize resource use and divert valuable waste from going to landfill. They work in partnership with a number of retailers and manufacturers to help achieve these goals. Being funded by government bodies such as the Department of the Environment, Food and Rural Affairs (DEFRA) allows them to build evidence on food waste and the necessary measures to reduce it.

Both the E.U. and the U.S. have 50% food waste reduction targets, Europe by 2020 and the U.S. by 2030 (National Zero Waste Council, 2016). As yet, Canada has no national targets, but the National Zero Waste Council (NZWC) has called for a Canadian target in line with that of the U.S. (NZWC, 2016). Several regions have modest targets. For example, Metro Vancouver's objective, working in collaboration with WRAP U.K., is to reduce household food waste by 10% by 2018 (Cech, 2016).

In Ontario, supermarkets, restaurants and manufacturers (among other businesses) must conduct a waste audit and create a waste-reduction work plan, and update that audit every year under Regulation 102/94 of the Environmental Protection Act. Smaller operations are exempt. The Recycling Council of Ontario (RCO) and the Ontario Ministry of the Environment and Climate Change (MOECC) give businesses advice and information on how to implement a waste diversion program. Although the MOECC clearly identifies that a successful waste reduction programme has multiple dimensions, the Regulations do not require businesses to include all streams of waste in their action plan, so food waste is often left out of companies' diversion programmes. The MOECC should set specific reduction and diversion targets (see discussion below regarding the Waste-free Ontario Act) for each stream, including organic waste. Opportunely, the supermarket chains have voluntarily included food waste in their diversion programs for various reasons discussed below. Unfortunately, the lack of transparency from these waste audits makes it difficult for those outside the retail sector to ascertain whether these companies are meeting any of their commitments.

Regarding processing, as some processing marketing boards have regulated contracts (e.g., the Ontario Vegetable Processing Marketing Board), waste reduction could become a

priority of contract execution with sectoral targets and product specifications so as to reduce waste.

Edible food for direct human consumption at minimum resource expenditure

- **Educational campaigns**
  Problem addressed: Consumer behaviour in household, retail outlets and restaurants, luxus consumption

Educational campaigns are often a preferred strategy because they can easily be implemented by the private or public sector and may increase consumer knowledge and awareness of food waste. They are politically acceptable because of their low-cost and accommodation of current food business models. Agri-food corporations may even benefit by promoting positive images of their commitment to consumer cost-savings, sustainability, and feeding the hungry. Overall, educational campaigns act as a step towards changing long-term consumer attitudes and behaviours regarding food waste.

Part of the challenge is the complex array of household characteristics, beliefs, attitudes and behaviours that influence food waste, some of which appear to be counter-intuitive (cf. Parizeau et al., 2015). Awareness does not always lead to greater understanding of how eaters contribute to the problem and what they can do to reduce waste (Guelph Food Waste Project, 2014). A survey of U.S. households found that 63% of consumers felt food waste was a problem, yet only 34% believed that their household contributed to it (Watson, 2014). Similarly, when respondents from Guelph, Ontario were asked what they could do to reduce waste, almost 40% could not think of anything (GFWP, 2014). Some studies show that once people are aware of the value of their losses, then there is more commitment to handling food more effectively (Hodges et al., 2011). Metro Vancouver appears to be banking on this in their food waste campaign, estimating that food waste is costing the average household $700/yr (Metro Vancouver, n.d.). Parizeau put forth a similar national estimate from her work, $760/yr/household (Tobin, 2016). Campaigns can also help consumers improve food purchasing skills, meal planning, leftover use, gauge what is safe to eat, and interpret date labeling. Additionally, interventions can help consumers develop a certain waste tolerance, for example, to accept a package of strawberries, even if one strawberry is damaged or spoiled (Terry, Mena, Williams, Jenney, & Whitehead, 2011).

Education campaign architects must understand the motivations that drive consumers to waste and how consumers frame this issue. Many households do not perceive food waste to be a significant environmental problem; rather, it is often viewed first and foremost as a social issue (Parizeau et al., 2015). Watson and Meah (2013) suggest environmental campaigns will not be very effective unless the ethic of thrift is linked directly via environmentalism. As such, educational campaigns may more effectively shape consumer behaviour by framing them with

social impacts, rather than strictly environmental or economic ones[14]. According to this thinking, food waste reduction campaigns should use guilt generated from throwing out edible food when many others go hungry.

There are several approaches and tools available to implement educational campaigns. One is to provide proper storage and handling instructions, near the product display, on small take-away cards. Another example is mobile phone applications that provide educational materials and tools to assist consumers with reducing their waste. In addition to Facebook and Twitter, WRAP U.K. introduced the Love Food Hate Waste App at no charge to communicate with consumers[15]. In the WRAP U.K. partnership with Metro Vancouver, such campaign strategies are being attempted in the Canadian setting (Goodwin, 2014). A third example could be radio, television, or print public service announcements, such as the food waste commercial commissioned by the Scottish government in 2014[16]. Provinces may have existing legislative frameworks to support this, for example, Ontario's Environmental Protection Act provides the means to finance educational campaigns.

Another common approach is to create "Days". On March 5 2014, a New Democratic Party (NDP) MP tabled a motion in the federal House of Commons:

> That, in the opinion of the House, the Government should: (a) declare October 20th of each year National Day Against Food Waste; (b) develop a comprehensive pan-Canadian plan to reduce food waste by (i) educating Canadians about food waste through a national campaign, (ii) facilitating the donation of safe, unsold food from the private sector to community organizations and food banks; (iii) putting in place various other measures to reduce the environmental impact resulting from the production of unused food (NDP, 2014, para. 6).

The motion also called for national targets and a national food waste reduction strategy but failed to pass.

- **Food label changes**
  Problem addressed: Consumer behaviour at retail, restaurant and household, luxus consumption

Another efficiency stage measure involves changes to food date labels. A variety of date labels are used on foods, including "sell by", "use by", best before" and "expiration" dates. In Canada, best before dates are required for pre-packaged foods that will keep fresh for 90 days or less; "use by" labels apply only to pre-packaged fresh yeast; and "expiration" dates are required for

[14] Note that WRAP .U.K. has chosen to focus primarily on the economic and environmental dimensions.
[15] Love Food, Hate Waste details at: http://www.lovefoodhatewaste
[16] Information is available at Greener Scotland, http://www.greenerscotland.org/

select products like infant formula (Canadian Food Inspection Agency, 2014). Of the various food date labels, best before dates cause the most confusion for consumers. They describe the anticipated amount of time that an unopened food product, when stored under appropriate conditions, will retain its freshness, taste, nutritional value, or any other qualities claimed by the manufacturer. Therefore, best before dates do not indicate food safety, as food is still consumable after the best before date has passed (CFIA, 2014). Unfortunately, many consumers are unaware that food recently past its best before dates is usually still edible and waste is the result.

The confusion over best before dates, and the subsequent fear of unsafe food, also drives waste at food retail. It has been documented in the U.S. that stores remove items in advance of these dates in order to maintain their image of carrying only fresh products (Gunders, 2012), and presumably the same occurs in Canadian retail outlets.

Although federal regulations dictate how dates are declared (CFIA, 2014), they do not guide how they are calculated. There are some specific guidelines for certain foods and bacteria (e.g., Listeria in ready to eat foods). Other jurisdictions, however, provide more guidance, including New South Wales (NSW) Australia (NSW Food Authority, 2010), New Zealand (New Zealand Government, 2012), and the U.K. (Food Safety Agency, 2011).

To ensure greater consistency, as part of pre-market clearance, companies with products covered by Best Before and Expiry date regulations should identify the method of determining durability and a summary of the data that supports the dates they propose. Since the Food and Drugs Act permits the Minister to prevent the sale of products with misleading labels, a regulatory amendment to the effect that the Minister can advise a firm to make changes to its Best Before dates, would then allow for adjustments should the Minister determine the dates to be inaccurate.

An additional initiative would be to post “freeze before” date marks on packaging in combination with best before marks for certain foods (WRAP U.K., 2012). This would require only minor amendments to Food and Drug Regulations B.01.007 (1.1)(c) for prepackaged product having a durable life of 90 days or less and packaged on the retail premises from which it is sold. A comparable amendment would be required to B.01.007(1.1)(b) for a prepackaged product having a durable life of 90 days or less and packaged at a place other than the retail premises where it would be sold. In a similar vein, a French co-op, Les Gueules Cassées, successfully created a “close to date” expiry label for their range of products. Food retailers buy the stamps and add them on any product they think should be discounted up to 50%, including vegetables, yogurt, cheese, deli meats, packaged sandwiches, and hummus (Perreault, 2015). Les Gueules Cassées also has consumer eduction materials and makes donations to NGOs working on food waste. Such approaches could be explored in the Canadian context.

- **Improving food donation**
  Problems addressed: Farm, retail, food service and restaurant waste

There are two key pieces of Ontario provincial legislation that facilitate the redistribution of food for donation. As part of the Local Food Act, 2013, the Taxation Act, 2007 has been amended, providing farmers with a tax credit of up to 25% of the market value for donated produce, in addition to the existing charitable donation tax credit. Additionally, the Donation of Food Act, 1994 protects donors from liability for any risks associated with food donated in good faith. While these pieces of legislation are encouraging, their effectiveness for increasing food donations remains uncertain.

First, potential benefits may not be realized if neither the benefactor nor community food organizations have supporting infrastructure. In a survey of comparable U.S. food manufacturers, retailers, and wholesalers, half of respondents cited insufficient storage and refrigeration at food banks and a lack of refrigerated trucks and drivers as barriers to donating food (Business for Social Responsibility, 2013). In order to facilitate food donation and to bolster the effectiveness of the tax credit, capital grants should be provided to improve transportation and storage infrastructure.

Second, despite the protections provided by the Donation of Food Act, many companies choose not to donate food out of concern for potential liability issues and negative publicity. These fears are unfounded, since the legislation is designed to protect donors except in cases of serious omission and gross negligence. Outreach and education to the private sector by the government and private charities may assist in overcoming this limitation.

Another approach to facilitate food donations is fostering linkages between volunteers and charitable organizations and producers, food retailers, and food service outlets. For example, governments and businesses should encourage innovation in online solutions, such as Ample Harvest, that quickly connect potential donors with community organizations (Gunders, 2012). Coordinating volunteer gleaners from charitable organizations can assist in overcoming high labour costs that deter farmers from harvesting excess or left over fruits and vegetables. Ontario Gleaners provides this service.

France (Chrisafis, 2016) and Italy (Samuel, 2016) have now banned edibles from being thrown out by supermarkets. Instead, they have to be donated. This could be considered in Canada in the future.

- **Technology changes**
  Problems addressed: equipment inefficiencies, distribution, manufacturing and retail waste

Reducing shrink throughout the food supply chain has been possible with technology changes to cold chain management (e.g., making sure all the products and their storage areas, including the truck, are properly temperature controlled), GPS tracking to know where the food is in the distribution chain, and improved packaging. At the store level, technology has improved maintenance of correct storage temperatures, moisture removal (hot air in plant tissue holds more moisture), and prevention of over ripening with ethylene scrubbers and bacteria and mould

reduction (e.g., with blue light radiation) (Director, Produce Operations, regional retail chain, personal communication, March 25, 2011). Such technology changes have occurred without significant state regulatory change, but if the state creates performance targets for critical technology systems, then such technology improvements might be accelerated. For example, most motors in cooling systems are old (Garnett, 2006). If the state progressively requires improvements in cooling motors and related cooling equipment, and companies replace older technology with new equipment, then more rapid system wide improvements would result. Under Canada's Energy Efficiency Act and Regulations, administered by Natural Resources Canada, some equipment is already covered (e.g., chillers, self-contained commercial refrigerators and freezers[17]), therefore the strategic direction is to expand over time the range of technologies addressed by the legislation, and to increase the performance requirements for those already covered.

The costs of improving or installing new equipment may be prohibitive for some food chain actors, such as smaller producers and retailers. In the short-term, retrofit grants could help offset their costs, thereby encouraging their participation in waste reduction strategies. Such grants have been used many times in the past to improve residential and commercial energy efficiency.

Additionally, moving into substitution stage initiatives, the regulations should be amended to require technology purchasers to accelerate their replacement of old technology. The current regulations apply to the sellers / dealers, but the buyers are not currently obligated to replace their old technology. Section 21 (e) of the Energy Efficiency Act states that the Minister: "(*e*) undertake such other projects, programs and activities as in the Minister's opinion advance that purpose [energy efficiency] ". Under that authority, buyers could be required to purchase such equipment on an accelerated schedule. Constitutionally, such an intervention could be justified under the criminal law power of the Dominion that authorizes initiatives to improve the environment (see Lucas & Cotton, 2013).

- **Packaging changes**
  Problems addressed: manufacturing, distribution, retail and household waste

For many perishables (e.g., strawberries), packaging has not changed substantially in recent years, but there are examples of promising improvements. U.K. grocer Marks and Spencer's extended the shelf life of strawberries by two days in their stores by inserting small ethylene absorbing strips in packages. It reduced waste by four percent (Business Green, 2012). Another technological advance is heat-sealed lids that considerably reduce pack weight while still maintaining product protection (Terry et al., 2011). To promote the use of more protective or innovative packaging by Ontario producers and retailers, producer and retailer organizations can disseminate information to their members on the potential of packaging improvement to reduce

[17] A guide to Canada's energy efficiency regulations can be found at: http://www.nrcan.gc.ca/energy/regulations-codes-standards/6861

waste. Consumers can also be informed through the use of educational campaigns, as discussed previously.

- **Size and portion changes, sales and returns**
  Problems addressed: restaurant and household waste, luxus consumption

Packaging sizes are also problematic, with many too large for small households and serving sizes in restaurants too large for many eaters. Smaller size options are desirable to reduce waste (Gooch et al. 2010).

Such measures can be facilitated by regulatory change. For example, modifications to the Canadian Consumer Packaging and Labelling Act (CCPLA), could widen state authority for food waste reduction. Some possible changes are outlined in Table A1 in the Appendix. Comparable changes would also be required to provincial regulations, such as the Ontario Farm Products Sales and Grades Act (see Table A2 in the Appendix). The associated regulations could be altered to forbid "buy one get one free" (BOGOF) sales for products and only permit "buy one get one free later" (BOGOF-L) sales (for example, a Tesco U.K. programme allows the free item to be picked up within 2 weeks). The Minister could also modify regulation 7 to restrict the ability of buyers to make last minute reductions to orders. As highlighted above, this often leaves the supplier literally holding the bag, with nowhere else to sell product and it goes to waste.

Regarding restaurant portions, as discussed above, the dominant approach generates considerable plate waste and contributes to overeating and associated health problems. Most food premises regulation is implemented at the provincial and municipal levels, but focuses primarily on food safety and does not serve well the changes proposed here. Federal and provincial food labelling regulations address primarily food retail establishments. However, a broad coalition of health advocates, first spearheaded by the Centre for Science in the Public Interest Canada (CSPI), has been calling for restaurant labelling. One formal response is Ontario Bill 45, Making Healthier Choices Act, 2015, that amended the Health Protection and Promotion Act. Although requiring calorie labelling on menus (coming into effect on January 1, 2017), it could be further amended to include a provision that meals exceeding 800 calories[18] provide a reduced serving size option that is at least 33% lower in calories. This could be accomplished by reducing the serving size to meet that objective, either by removing certain items from the meal, or by reducing portions of all meal components. This approach does not require menu and ingredient reformulation, though some restaurants may choose to reformulate meals to bring them under the 800 calorie threshold. Restaurants without standard plate sizes – buffets, tapas, sushi and dim sum – would probably have to be exempted for logistical reasons[19]. Bloom (2010) provides the example of T.G.I. Friday's, a chain eatery in the United States, that launched a

[18] A more thorough review of the literature might determine a different threshold, but something around this one is likely suitable, given average person caloric requirements of 2000 calories (see discussion above)
[19] Note that there is a longer term question about eliminating buffets because of their contributions to overconsumption and waste generation (see Maguire, 2016).

"Right portion, right price menu" in 2007, where they served about two-thirds of an entrée for two-thirds the regular price. Bloom (2010, p. 130) states that this programme "proved so profitable that the chain made the promotion permanent a year later".

Animal feed

- **Expanding Suitable Feeds**
  Problems addressed: processing and restaurant waste, animal dietary inefficiencies

The federal Feeds Act and Regulations permit many kinds of plant, fish and animal processing by-products as animal feed (see schedule IV and V of the Feeds Regulations[20]), and there is a relatively well established infrastructure (from farm, processing and rendering facilities) for using such materials as feeds. Some of them (e.g., some animal by-products) will need to be progressively delisted to meet the conditions of the environmental protocols (above). Consumption will decline with animal population shifts and changes in the human diet, which will cause perturbations in the processing by-products markets.

The situation is more complex for plate waste from restaurants, institutions and households. Such materials are not named directly in the Feeds Regulations as they focus on single ingredient feeds and constituents. Plate waste is banned as a ruminant feed in Canada over fears of Bovine Spongiform Encephalopathy (BSE) or mad cow disease. Such feeds are typically only given to pigs, and only as a part of their diet. Belonging to the broad category of Recycled Food Products (RFPs), their use is now highly constrained. If sold, they must meet the conditions of the Feeds Regulations, highly unlikely because the regulations only grant minor variances in composition of the kind that plate waste cannot generally meet. They may be exempt from some of the regulations if they are donated to a single individual who uses them directly and does not redistribute. They must, however, be handled in a sanitary manner, which typically means refrigeration and then steaming to avoid disease spread. The rules effectively do not permit donation of plate waste from kitchens that also prepare meat, unless they are registered as feeds (CFIA, 2014a), a highly unlikely outcome given other conditions. Given the rules, and the infrastructure required to use plate waste on a widespread basis, opportunities as animal feed in the short-term are highly limited. Should Canada be sufficiently free of BSE in the medium term, some of the restrictions might be relaxed.

Human and animal inedibles directed to compost and industrial applications

- **Compost—backyard, mid-scale community, curbside**
  Problems addressed: Household, restaurant and retail waste, nutrient inefficiencies

[20] The Feeds Regulations can be found at: http://laws-lois.justice.gc.ca/eng/regulations/SOR-83-593/page-17.html

Given our hierarchy, food waste should first be composted in backyards, on-site at multi–unit residential buildings (MURBs) and at specific activity areas, such as farmers' markets and regular event locations. If this is not feasible, either because of the absence of facilities or the challenges of composting certain inedibles (e.g., bones and meat scraps in the presence of rodent and raccoon populations), then community (neighbourhood) composting is preferred, followed finally by residential and business pick up systems for centralized composting[21]. Backyard composting requires the least infrastructure and transport. Sites at MURBs and event locations are more complex to manage. Community composting requires more infrastructure and time to execute, and curbside pickup and centralized systems are the most expensive, involving the highest infrastructure costs and the most complex distribution. With anaerobic digestion in centralized collection systems, however, facilities have the greatest potential for methane capture which is part of their appeal for the dominant system in an environment of surplus accumulation (see O'Brien, 2013). However, all composting systems can generate poor quality product and high emissions, thereby making utilization problematic.

Numerous municipal programmes provide access to backyard composters and information, but are highly variable in the quality and effectiveness of other programmes, especially on-site composting in MURBs and event locations. In Ontario, municipalities were not required under the 2002 Waste Diversion Act[22] to collect food waste although most large municipalities do. The City of Toronto's Green Bin Program (GBP) is one of the largest organic waste diversion programmes in North America but until recently did not have the capacity to make compost from all its organic waste. Unfortunately, the procedure for building supporting organic waste processing facilities is long-term and cost prohibitive for many municipalities and businesses (Gooch et al., 2010). If actual diversion is lower than projected due to prevention and reuse resulting from measures proposed here, the current infrastructure may be adequate.

Unfortunately, most of the composted material in Toronto's programme is of such poor quality that it cannot be used for growing food (Seccombe, 2013). Equally significant, after the programme was put in place, the City reduced resources devoted to backyard composting (Vidoni, 2011) which, in our framework, is highly counterproductive. In contrast,

> the City of Edmonton has taken a unique approach to both solid waste and biosolids management at its composting facility, where 200,000 tonnes of organic municipal solid waste and 100,000 tonnes of biosolids are processed together to produce a compost that is sold to the agricultural, landscaping and land reclamation industries (Forkes, 2011, p. 65).

[21] Note that Life Cycle Analyses (LCAs) have not been conducted sufficiently to allow a full comparative assessment of these options (see Morris, Matthews, & Morawski, 2011).
[22] This act is being replaced by the Waste-free Ontario Act, which received Royal Assent in June 2016 but many measures will take several years to bring into force.

This suggests it is possible to design a curbside collection programme that can produce high quality compost.

In Ontario and other Canadian jurisdictions[23], community and mid-scale composting are essentially blocked by existing regulations. Community composting facilities would have to meet the regulatory and structural conditions set out for compost facility approval (OMOE, 2012) and obtain a certificate of approval as a waste disposal site. In Canada, this situation occurs because composting is still viewed primarily through the lens of waste diversion, rather than as an essential part of the nutrient cycle. In contrast, the five boroughs of New York City have some 200 sites, facilitated by the New York City Department of Sanitation's (DSNY) Bureau of Waste Prevention, Reuse, and Recycling (BWPRR) (Goldstein, 2013). There are many proposals to take a new approach, with one being considered at an urban farm in NW Toronto, but it is not yet clear what this will produce.

In the Ontario system, community composting sites should be exempted under the Environmental Protection Act, if they met the following conditions:

- The facility only receives residential food scraps and yard waste (with potentially very select addition of nitrogenous or carbonaceous material to obtain proper C:N ratios for composting quality). Québec allows up to 150m^3 of off-site waste to community sites at any time provided it does not contain any problematic material (e.g., meat, industrial waste) (Vidoni, 2011).
- Aerobic composting only.
- The operation composts less than 14 tonnes per week[24].
- In urban areas, minimum distances of 10 m[25] exist to the nearest property line, water body, road or pedestrian walkway.
- A leachate mitigation plan is in place.
- The facility meets the "A" compost quality standards.

Curbside programmes would also need significant modification to create useable compost. Although participation rates are high, there is debate about how much household organic waste is actually put in the bins, so improving that rate is important. By some accounts, one-third of current garbage is still organic waste (Alfred, 2013). There are a number of issues associated with the current programme in Toronto. The use of plastic bags increases participation but decreases quality. The bins are poorly designed to prevent raccoons. Some percentage of the collected material does not get composted at all, in part because of a lack of processing facilities. Much of the composting is anaerobic which generally reduces nutrient quality in the residue that

[23] The federal government typically has jurisdiction only over hazardous waste, while non-hazardous waste falls under provincial jurisdiction. See Lucas and Cotton (2013).
[24] Vidoni (2011), based on US rules. Note this is also below the MOECC threshold for requiring an EAA.
[25] The MOECC states there should be a minimum of 100m between all buildings, processing and storage areas, access roads, the nearest residence, school, place of worship, hospital, and any other public institution, bodies of water. Such distances are not viable in urban areas.

is subsequently aerobically composted in windrows. Efforts continue to use the methane generated for electricity production. Given the new provincial categorization scheme (OMOE, 2012a), Toronto compost should at least meet "A" compost requirements.

- **Increase tipping fees**
  Problem addressed: all wastes destined for landfill

"From a retailer's perspective, if you could get your dumpster to get hauled for half the price to go to landfill than to a compost facility, it's an easy choice. Their business is food, they need to make money to keep their costs down." (Policy analyst, Environmental Commissioner of Ontario, personal communication, February 25, 2011)

Municipalities can use by-laws to set user and tipping fees. There is some debate about the level at which such fees would encourage alternative behaviour and the question is affected by the degree to which alternative approaches exist, with suitable infrastructure and support. As part of a long-term transition strategy, increasing fees is a first step to more significant changes down the road. Some evidence from local Canadian jurisdictions suggests fees over $100/tonne are required to get significant diversion (Anderson, 2014).

- **Food waste and provisions of the Waste-free Ontario Act**
  Problem addressed: All

Compared to the 2002 Waste Diversion Act, the new Waste-free Ontario Act places greater emphasis on resource recovery, the circular economy, waste reduction and producer responsibility for waste. Up to this point under the 2002 Act, organic waste did not receive substantial attention, although many municipalities have been running green bin programmes. However, many provisions of the new legislation will take time to put into force and the language of the Act is broad and enabling, with only one overt reference applicable to food waste. Under 69(2), regulations can be adopted that,

> "(a) must allow for the material or part of the material to be:
> (i) reused,
> (ii) used in the making of new products, packaging or other things, or
> (iii) used as a nutrient for improving the quality of soil, agriculture or landscaping;"[26]

The government is responsible for developing a strategy entitled Strategy for a Waste-Free Ontario: Building the Circular Economy, with goals and reporting on implementation. The consultation document (MOECC, 2015) of the same title indicates that the goals of the final strategy will include zero waste and zero GHG emissions associated with waste. There would be

[26] Waste-free Ontario Act, http://www.ontla.on.ca/bills/bills-files/41_Parliament/Session1/b151ra.pdf, p. 7

an organics action plan as part of the wider implementation agenda. It would address the entire supply chain, and build upon existing initiatives, with development and rollout through 2018. The Strategy would also consider disposal bans. While encouraging, ensuring that the details of the regulations support the initiatives set out here is the challenge.

- **Improving deadstock handling**
  Problem addressed: Farm production waste

In natural systems, dead animals become food for scavenger and decomposer organisms, representing a more closed nutrient loop than exists on many modern farm operations. Admittedly, recreating such conditions is difficult on smaller farms proximate to settled areas, though perhaps still feasible in extensive rangeland scenarios.

Deadstock is regulated provincially and the rules have shifted significantly since the BSE crisis of the early 2000s. In Ontario, the Nutrient Management Act (2002) and regulations largely govern disposal of animals that die on-farm. The shift was designed to provide greater environmental protection and separation of dead from live animals. For animals that die off-farm, the regulations of the Food Quality and Safety Act (FQSA), 2001 are in effect. They are designed to ensure that deadstock does not end up in the food chain[27].

On-farm, there are numerous disposal options, including: "burial, incineration, composting, disposal vessels, collection by a licensed collector, anaerobic digestion, delivery to a waste disposal site approved under the Environmental Protection Act, delivery to a disposal facility as defined under the FSQA, delivery to a licensed veterinarian for post mortem and disposal."[28] From an agroecological perspective, composting on-site is the most desirable option if there is a suitable land base for cycling the nutrients, followed by on-site anaerobic digestion if the digester collects methane and the residue can be properly distributed as nutrients. Admittedly, there are challenges for on-site composting though OMAFRA believes it is a very viable option and does provide guidance[29]. Licensed collectors can also transport to centralized composting sites, though this is less favoured because of the transport and the challenges with redistribution of compost. They may also take deadstock to rendering facilities, though opportunities for re-using material from ruminants have declined significantly since BSE[30]. In an emergency situation (e.g., barn fire, natural disaster), the regulations may be waived and other options approved. On-site composting has only been permitted since 1996, so it is probably not the favoured option, and if a farm does not already have a suitable composting system, the installation costs can be significant. But fees charged by firms for deadstock disposal have

[27] OMAFRA's deadstock regulations: http://www.omafra.gov.on.ca/english/nm/regs/deadstock/summary.htm
[28] OMAFRA's deadstock regulations: http://www.omafra.gov.on.ca/english/nm/regs/deadstock/summary.htm.
[29] Two OMAFRA factsheets on different approaches to on-farm composting can be found at: http://www.omafra.gov.on.ca/english/engineer/facts/10-063.htm, and http://www.omafra.gov.on.ca/english/engineer/facts/09-031.htm
[30] Those parts of the animal deemed at risk of carrying BSE must be removed and most of that is landfilled. The volumes have increased since the enhanced feed ban went into effect in 2007 (Koch, 2009)

increased (from first paying a fee to the farmer, to free pickup, to a government subsidized fee for certain stock, to a significant fee without subsidy, see Sun Media, 2009), perhaps encouraging more on-site burial, but not necessarily composting (Crosby, 2009). Canadian renderers report a 50% decline in deadstock material picked up since the implementation of service charges (Koch, 2009), but some environmental organizations are opposed to on-site composting for fear of negative water quality impacts (Vandusen, 2010).

For animals that die off-farm, on-site composting at other locations in the supply chain is not permitted.

> The FSQA regulation provides for centralized composting of deadstock. It sets out the application, siting, facility and operational standards and requirements for those centralized deadstock composting facilities. The facility and operational requirements provide for various composting and curing methods as well as for composting pads made of different materials. The regulation establishes turning, temperature and substrate standards. Compost that is derived from deadstock and that has been composted in accordance with the regulation may only be sold if it meets all of the prescribed standards for finished compost. Material that fails to meet the requirements may be re-composted or disposed of at an approved waste disposal site depending on the regulatory defect(s). The regulation specifies who may transport material, other than finished compost, from a composting facility.[31]

The current policy approach, as with many aspects of agriculture, is to present a buffet of options from which private landowners can choose. The state does not necessarily encourage the most desirable options. From a nutrient cycling perspective, this is suboptimal. The priorities should be on-site composting for farmers wherever feasible and centralized composting facilities for other segments of the food chain. For farmers, a big problem is assessing the hazards of composting on their farms, and then designing and paying for the right kind of composting approach. Providing extension and consulting services to design and executive an optimal strategy is paramount. Regarding, centralized facilities, many regions of Canada do not have such facilities, or enough disposal and rendering companies to support a facility or handle BSE or PED hazardous material for landfilling. The provincial governments should create funding pools for deadstock infrastructure that are analogous to the programmes that partly subsidize human waste management.

- **Easing transitions of the rendering industry**
  Problem addressed: Processing waste and resource recovery

[31] OMAFRA's deadstock regulations: http://www.omafra.gov.on.ca/english/nm/regs/deadstock/summary.htm.

Given how much of an animal is not edible for humans, and the challenges of deadstock, the rendering industry plays a critical role in a food waste hierarchy. The sector has been challenged since the discovery of BSE in Canada in 2003, partly by the expense of new regulations to minimize the spread, and partly by shifts in markets. But equally significant, the sector has a major interest in high levels of animal product consumption and high animal densities, both conditions that have to shift for reasons of sustainability and health. So, the challenge is locating an appropriate and viable place for the sector as wider shifts in consumption and production take place.

The federal government should finance a third party assessment of transition options for the rendering industry, consistent with this paper, under Growing Forward III contribution agreements.

Sewage sludge and humanure application to land to close nutrient and energy loops

Sewage treatment is a highly complex topic, worthy of a paper of its own, but here we provide some summary thoughts on transitional strategies that fit within the themes of this article.

- **Separating sewers in established communities**
  Problem addressed: nutrient recovery

Many neighbourhoods in Canadian cities were built with combined sewer outflows (CSOs), rather than separate piping for household waste water and storm runoff. For example, in the older parts of Scarborough in Toronto, most houses were built with CSOs, and from the 1960s, new subdivisions were constructed with separate systems. By 2008, approximately 35% of the area had combined sewers, 45% had partially separated sewers[32] and only 20% was separated[33]. Compounding this problem, many commercial facilities also have CSOs. Commercial and residential downspout disconnection programmes have helped reduce, at a relatively low cost, the number of partially separated systems. However, fully separated systems are expensive to create from CSOs, and progress has been slow, dependent particularly on capital budgets. In Toronto's case, the municipal government has a 25-year Master Plan to improve stormwater management and sewer systems.

Continuing the process of pipe separation of industrial from residential and elimination of contaminants and of residential CSOs are critical strategies.

Substitution initiatives

[32] In a partially separated system, street stormwater is carried off separately, but household stormwater ends up in the household waste water pipes.
[33] Public education materials from a 2008 public consultation on sewage separation in Scarborough sheds light on this, http://www1.toronto.ca/city_of_toronto/policy_planning_finance__administration/public_consultation_unit/toronto_water/scarborough_waterfront/files/pdf/2008-06-16_posterboards.pdf

This phase involves new organizational arrangements, the substitution of processes and practices, and brings alternative / niche activity into the dominant flow of change. What new structures can be put in place for resource planning? What regulatory instruments might move firms from efficiency measures to this stage?

Edible food for direct human consumption at minimum resource expenditure

- **Protocols for resource efficient production**
  Problems addressed: solar, metabolic and input inefficiencies

In other work, MacRae and colleagues (MacRae et al., 1990, 1990a; 1993, 2009, 2010, 2012) have set out the strategies for altering food production and processing to significantly reduce resource consumption; therefore, these dimensions will not be addressed here to any extent except to highlight the need for mandatory production protocols that reflect such progressive redesign of production and processing. Many voluntary standards currently exist (e.g., organic, natural, animal welfare, integrated pest management), but none is mandatory and only a few are backed by state regulation through the Canadian Agricultural Products Act (CAPA) and in some cases provincial regulation (see rules governing, for example, organic in British Columbia and Québec). The existence of such protocols would facilitate some of the proposals set out here.

- **Grading changes**
  Problems addressed: Farm, processor and retailer waste

Grades were originally created and regulated to help stream products to different end uses, based on the "quality" parameters identified by the grade. However, over time, the grade structures have been changed and simplified. In many foods, different varieties are now grown under contract for specific end uses, that is, the grade becomes less meaningful for determining end use designation. As discussed earlier, retailers impose their own quality standards that exceed regulated grades. However, the consequence is that the cosmetic perfection imposed by retailers results in higher levels of waste.

The removal of grading standards for fresh market fruits and vegetables (excluding potatoes) by OMAFRA [34] presents a unique opportunity to explore the relationship between grading standards and food waste. Earlier studies postulated that grading standards caused food waste by preventing producers from selling subgrade produce to secondary processing markets. Our interviews suggest, however, that the removal of grade standards has not changed supply chain behaviour because retailer standards are higher than state ones.

[34] Revoking Reg. 378 of the Farm Products Sales and Grades Act.

Instead of having government regulate a floor standard for food quality, it should instead impose a ceiling standard that retailers cannot surpass. The standard should be designed explicitly to balance quality against waste minimization. For instance, cucumbers that are more than "moderately curved" and are longer than four inches should be included in Canada grade No. 2 cucumbers, while under the previous approach (prior to grade elimination in 2011) they would have been excluded because of the curvature. Such changes would help producers either enter the existing market or create a niche market for those foods that are misshapen and discoloured but taste just as good if not better and are high in quality despite the way they may look. Producers can find innovative ways to market the different kinds of products. There are consumers interested in buying foods that do not fit the typical perfectly displayed appearances and actually look for good taste. Retailers in France, Québec, Ontario, Alberta and the U.S. have already cottoned on to consumer interest and are marketing "ugly" and "misfit" produce (Cliff, 2014; Galliot, 2014). Loblaw's is slowly taking its new program national (Liu, 2016). Although popular with many consumers, not all these programs are well designed to reduce waste, in that some divert food from processing to the fresh market that is not actually unsellable grade-outs coming directly from farmers (Perreault, 2015). Consequently, in the Ontario case, to assure substantive waste reduction, new grade standards for fruits and vegetables will need to be introduced under the Farm Product Sales and Grades Act to replace the earlier *Regulation 378* that was revoked.

- **Regulating varieties for processing**
  Problem addressed: Farm and processor waste

The choice of variety can have a significant impact on waste generation. Perhaps the most emblematic example is the Russet Burbank potato, long used in French fries by the fast food industry. It is a long season variety and historically very demanding of moisture and nutrients, resulting often in significant irrigation, pesticide and fertilizer use. Only about 50% of the potato is used during French fry production due to the imposed standards of the industry and there can also be significant field culling. All these realities have encouraged the fast food industry to explore other varietal options (Escober, 2010). Under the Ontario Farm Products Sales and Grades Act and the Potato Regulations under the Farm Products Marketing Act, it would appear that the authority exists to determine what varieties can be processed and under what conditions[35]. A set of varietal regulations should be developed that favours those with lower resource requirements and waste factors.

Can current legislation forbid other contract provisions that contribute to food waste? The Farm Products Marketing Act appears to offer such a possibility. The Act provides "for the control and regulation in any or all aspects of the producing and marketing within Ontario of

[35] See clause 19, Ontario Regulation 247/99**,** http://www.search.e-laws.gov.on.ca/en/isysquery/bd27fbf1-e226-45a6-9c15-7cdff0eae1c1/9/doc/?search=browseStatutes&context=#hit1

farm products including the prohibition of such producing or marketing in whole or in part."[36] With suitable supporting regulations, the Commission created by the Act could govern contracts in this way.

- **Requiring sustainable procurement**
  Problems addressed: Solar, metabolic, land use, water and nutrient inefficiencies, farm waste

Although many firms have sustainability goals, these are often disconnected from food buying practices. There are a number of reasons for this related to internal firm dynamics (Cooke, Stanley, Carter, & Whitehead, 2014), but one part of the problem is the lack of authentication of sustainability claims. Typically, procurement programmes need robust authentication to assure buyers and consumers. As part of resource efficient production protocols (see above), it would also be desirable to establish waste minimization certification programmes, with elements of the protocol designed to alter supply chain behaviour. There are examples of solid waste certification programmes offered on a voluntary basis for commercial and institutional properties (e.g., the Recycling Council of Ontario's 3R Certified[37]) that could be adapted. A certification mark under the federal Trade-marks Act[38] could be established to support the branding of the project. Ideally, such measures would also be supported by provinces for goods traded within their province, perhaps similar to the programme of the Conseil des appellations réservées et des termes valorisants (CARTV) in Québec[39]. As part of this, increased supplier-retailer collaboration can be a significant benefit. A WRAP U.K. project found noticeable waste reductions in all eight case studies as a result of increasing supplier-retailer collaboration (Tupper & Whitehead, 2011). Such collaborations help firms meet their targets under the Courthauld Commitment, a U.K. grocery sector voluntary plan to reduce waste in the food supply chain.

- **Advertising**
  Problems addressed: Luxus consumption

Luxus consumption must be reduced, for reasons of population health and food waste reduction. Many ads depict excessive portion sizes and eating, binging and addictive reactions to foods, and dreaming about eating. Food advertisements do increase consumption (Harris, Bargh, & Brownell, 2009). Chou, Rashad, and Grossman (2008) estimated a ban on fast food ads would reduce the number of overweight children between 3 and 11 by 18% and overweight adolescents between 12 and 18 by 14%. Québec has for many years banned food advertising targeted to

[36] The Act can be found at: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90f09_e.htm
[37] Programme details at: http://3rcertified.ca/
[38] This is based on our reading of Buckingham (2014).
[39] Details at: http://www.cartv.gouv.qc.ca/en

children under 12. One study found that Francophone families are primarily affected by the ban. Francophone young adults in Québec were 38% less likely to purchase fast food than their Ontario counterparts (Dhar & Baylis, 2011).

Television and print ads outside of Québec are weakly regulated in Canada, although the Minister of Health recently announced a process to tighten the rules around advertising to children (Lunn & Harris, 2016). There is no longer a mandatory requirement for pre-market screening of print and internet ads. Internet and social media are more difficult to regulate at this stage, although still covered by the general requirements of the Food and Drugs Act (FDA) and Canadian Consumer Packaging and Labeling Act (CCPLA). Other than the general fraud provisions of federal legislation and certain specified requirements[40], guidance is voluntary, through the Canadian Association of Broadcasters' Code of Ethics[41] and the Canadian Code of Advertising Standards[42].

We propose that food ads no longer show people eating, that only the product be shown. Use of cartoon characters would also be forbidden. Consequently, new regulations in the Food and Drugs Act (FDA) and the Consumer Packaging and Labeling Act (CPLA) will be required to prevent depictions of food being consumed. This should be undertaken as part of a broader initiative to bring many voluntary measures in the two codes into regulation. Clause 14 of the Canadian Code of Advertising Standards provides a framework for removing such depictions but additional language is required.

- **Design standards for waste minimization**
  Problems addressed: Processor, retail and restaurant waste and resource inefficiencies, animal feed, food donation

Some Canadian cities have now instituted green standards for residential and non-residential building siting, commissioning, design and construction. Toronto adopted such a standard in 2009.

> The Green Standard is a set of performance measures that promote sustainable development.... The Toronto Green Standard is a key element of the City's Climate Change Action Plan, an aggressive environmental framework aimed at reducing Toronto's greenhouse gas emissions by 80 per cent by 2050...[its authority flows from].... Official Plan Amendment 66 that enables the City to address

[40] See CFIA's guide to advertising requirements for industry, http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/advertising-requirements/eng/1388685207800/1388685209565
[41] Available at: http://www.cab-acr.ca/english/social/codes/ethics.shtm
[42] Available at: http://www.adstandards.com/en/Standards/canCodeOfAdStandards.aspx

> sustainable design elements on the exterior of a building as provided for with new powers for Site Plan Control in the City of Toronto Act.[43]

The standards do not currently contain explicit reference to building design to minimize waste generation, however, the energy efficiency measures are pertinent to this discussion (e.g., efficient heating and cooling processes). The solid waste dimensions of the standard can be modified to include:

- facilities for depacking loads and recuperating useable foods
- kitchens that permit use of soon to expire fresh foods in preparation of deli foods
- facilities for chilling foods that cannot be sold for human consumption but could be donated to pig producers or diverted for industrial purposes
- restaurant designs that permit easy source separation collection and storage (Maguire, 2016)

In Toronto's case, the green standard has mandatory (tier 1) and voluntary (tier 2) provisions. Such measures proposed here could start as tier 2 measures and later, once tested and refined, become tier 1 measures.

A further step would be to regulate the actual design of store shelves and display areas. Store designs encourage waste in 2 specific ways (see Ontario Public Interest Research Group, 1990). First, they encourage shoppers to buy more than they intended (70% of purchases for the average shopper are impulse buys). Second, the typical store is set up so that fresh fruits and vegetables are the first items to be purchased. This conveys abundance and encourages more purchasing, but it also means the most perishable items have to be continuously shifted in the shopping cart to avoid damage. This reduces their refrigerator life and generates more waste. From a waste reduction perspective, it makes much more sense if the produce section is the last stop before the checkout. It is unlikely that stores will voluntary change the flow of customers, so this should be regulated by municipalities as part of green design standards.

Animal feed

- **Environmental protocols**
  Problems addressed: Solar, metabolic, land use, water and farm input inefficiencies, animal populations

Implementing environmental protocols includes triggering evolutionary changes to animal populations and animal feeding regimes (see discussion above under Human Edibles). These

[43] Appendix D of Urban Design standards for mid-rise buildings in Toronto, http://www1.toronto.ca/City%20Of%20Toronto/City%20Planning/Urban%20Design/Mid-rise/midrise-AppendixD.pdf

shifts can progressively address many of the resource inefficiencies discussed above. In future work, we will be exploring how the architecture of Growing Forward III, the federal agricultural policy framework, can be used to ensure creation and adoption of such protocols.

- **Plate waste regulatory changes**
  Problems addressed: Feed efficiencies, restaurant and institutional waste

There is a significant requirement to build strategic infrastructure that links plate waste to swine producers. Hogs are by nature scavenger animals (Honeyman, 2005), but the centralized nature of much swine production, including the feeding regimes, makes it unlikely that large hog operations will be interested in plate waste. The challenge then is to find small-to-medium sized operators who will find plate waste a viable feed. The best opportunities may lie with marketing co-operatives and private aggregators. Similarly, it makes sense to aggregate plate waste suppliers, focusing on large institutional food service in a single or clustered location. Ideally, providers and users are in proximity which suggests the need to focus on large institutional food service in centres adjacent to pig production areas. However, this will not likely be feasible until rules restricting meat plate waste are relaxed. Then, it would be possible to establish collection systems without segregation. Refrigeration of waste is a critical feature as is steaming, but the latter could be carried out by intermediaries if it was not feasible for the co-op or aggregator to establish such a facility. To test the viability of such systems, provincial governments could provide support with capital grants for the establishment of suitable facilities.

Human and animal inedibles for compost and industrial applications

- **Curbside collection programmes: residences, MURBs and commercial establishments**
  Problems addressed: Retail, restaurant and household waste

Municipal planning departments should require new multi-residential buildings to have organic waste collection infrastructure incorporated into their design. The hope is that such initiatives will be mandated to municipalities by the Ministry of the Environment and Climate Change (MOECC) as part of the organic waste action plan under the new Waste-free Ontario Act.

- **Landfill ban**
  Problems addressed: All organic waste designated for landfill

In Ontario, municipal and/or local governments can regulate waste management and recycling activities through their by-laws, including setting in place landfill bans (restricting what

materials can be landfilled)[44]. The new provincial Waste-free Ontario Act also sets the stage, within the Strategy required by the province, to enact disposal bans.

A number of other jurisdictions have undertaken such initiatives. The government of Nova Scotia enacted a landfill ban for all organic waste in 1998 (Friesen, 2000), and currently, a negligible amount of organic waste is sent to the landfills. This ban led to further implementation of the compost and biogas industries; however, Nova Scotia is currently struggling to send its organic waste to such facilities because the infrastructure was not set up efficiently when the ban was enacted. The Regional District of Nanaimo has a ban on commercial organic waste[45]. Metro Vancouver brought in an organic disposal ban on January 1, 2015, with an effective date of July 1. The staff has noticed an increase in depacking services, organic pick up services, and a 10% improvement on tonnage going through local composting facilities. Restaurant and institutional food service source separation systems have increased dramatically. Although enforcement is an ongoing challenge, and fines are still being levied, organics are down from 36 to 28% of the waste stream (Marr, 2016). Massachusetts implemented a ban in 2014, and Vermont has set one to begin in 2020 (Specht, 2013).

Ontario would have a difficult time implementing a province-ban in the short term. However, as a substitution stage strategy, many changes to waste reduction infrastructure and management will have already been implemented before a landfill ban is enacted, making it more feasible.

Sewage sludge and humanure application to land to close nutrient and energy loops

- **Nutrient removal technologies**
  Problems addressed: Nutrient inefficiencies and recovery

Numerous technologies have been used, and others are under development, to remove nutrients from sewage sludge and urine and make them available to the fertilizer industry. For example, "even among facilities not currently regulated for specific numeric criteria, many have the capacity to remove as much as 20 to 50 percent of their current nitrogen load through minor process changes that require little capital investment." (The Johnson Foundation, 2014, p. 8)

This approach avoids the problems associated with spreading biosolids, and consequently is an intermediate stage strategy. Struvite is one of the best developed products, rich in P, Mg, and N. Precipitation, thermal treatment, crystallization, separation and wet chemical processes have been used to extract nutrients, in research and/or in practice (Water Environment Research Foundation, 2011). Some 30 nutrient recovery processes have been identified (Cordell, Rosemarin, Schröder, & Smit, 2011) and many others are at the assessment stage with questions such as: how efficiently does the process extract nutrients; at what quality, financial and resource cost; and what kinds of revenues they can generate to balance against costs, what kinds of

[44] For details on how waste is regulated in Ontario, see https://www.rco.on.ca/how_waste_is_regulated
[45] The by-law is available at: http://www.rdn.bc.ca/cms/wpattachments/wpID98atID2047.pdf

regulatory environments might favour recovery? Public utilities will need support to test and implement these systems.

- **Small scale/decentralized sanitation systems in smaller new settlements**
  Problems addressed: Nutrient inefficiencies and recovery

In new small settlements, some of which are deliberately positioned as eco-village designs, there are opportunities to rethink the traditional approach to sanitation systems. Ranging from individual household onsite systems to community-level designs, many have proven to be feasible at lower cost, and may better serve remote or low-density populations. Many also are able to dispose of treated or untreated excreta/wastewater on land because humanure is not contaminated with industrial pollutants (Cordell et al., 2011).

- **Change code rules to permit more composting toilets and solid (rather than wet) sanitation systems**
  Problems addressed: Nutrient inefficiencies and recovery

Austin Texas may be one of the few cities in North America that permits composting toilets (Price, 2009). There are substantial issues with dispersion of the compost. However, the Ontario Building Code appears to permit them under Class 1 of its five classes of sanitary sewage and disposal: a chemical toilet, an incineration toilet, a recirculating toilet, a self-contained portable toilet, and all forms of privy including a portable privy, an earth pit privy, a pail privy, a vault privy, and a composting toilet system, all of which can receive only human waste.

Redesign initiatives

Edible food for direct human consumption at minimum resource expenditure, animal feed, and human and animal inedibles for composting and industrial applications

- **Demand-supply Coordination**
  Problems addressed: All

This phase involves the redesign of food production, distribution and processing for waste minimization through the lens of demand-supply coordination. A system built on demand-supply co-ordination shapes production processes to meet consumption requirements that improve the health of the population. It takes more of a "feed the family well, trade the leftovers" approach (Kneen, 1992).

On the demand side, MacRae and colleagues have set out strategies for encouraging more optimal food consumption (Toronto Food Policy Council, 1994; 1996; 1997; MacRae et al., 2012a). There have also been a few studies examining demand-supply management scenarios

with optimal health a significant consideration (see for example, Desjardins, MacRae, & Schumilas, 2010; Ostry & Morrison, 2013; a review in MacRae, 2014), but these have not proposed mechanisms and tasks for executing such a process.

Building on Sweezy's theories of capitalist surplus, O'Brien (2013, p. 202) argues that,

> capitalist societies are permanently scarred in one of two ways: either by a crisis of excess – where there are simply too many goods on the market and the restricted consumption of the masses prevents their sale – or because the productive forces themselves are left to stagnate in order to offset precisely [a] crisis of underconsumption.

What is lacking is the mandate, structural linkages and governance across the food system to substantially address this reality and to reduce waste in all its forms and create greater resource efficiency. One possible solution is widespread demand-supply coordination (DSC) at a macro scale, broadly positioned within the arena of Integrated Resource Planning. DSC, if properly designed, could help reduce luxus consumption by changing the mix of products the food system provides, re-orient production to resource efficient approaches, reduce the distance food travels, and create greater food utilization along the supply chain.

DSC is not a popular concept in a food system run largely by private interests with relatively minimal state intervention. Private firms view it as interference in market function and, in countries dominated by oligopoly capitalism, the state is reluctant to intervene on the food demand side of the ledger, viewing its function primarily as management of supply (see Hedley, 2006). For many, it is linked to the earlier failures of central planning, and certainly the lessons of those failures must be reflected in a more reflexive and flexible design for demand-supply coordination (Voß, Smith, & Grin, 2009).

Clearly, there are pros and cons to DSC for food system actors. For producers, long term security is generally more favourable than short term, so designing such incentives in the system is an important consideration (Gille, 2013). In other words, can demand-supply coordination create a financial security that does not currently exist through more volatile or unreliable risk management instruments, such as production insurance and futures markets? It also means shifting production and marketing based on management considerations beyond the farm, something that challenges a traditional view of farming as private property rights and management. For manufacturers and retailers, it means shifting product options to comply with optimal nourishment requirements and volumes. For consumers, it means higher availability of some healthy goods (and sometimes at a lower price to encourage consumption) but lower availability of less nourishing items (and potentially at a higher price to discourage consumption). It also suggests significant changes in shopping behaviours and potentially shifts

in the type and locations of food retail outlets[46]. All this challenges traditional interpretations of consumer choice.

In Canada, the supply-managed commodities are currently the most visible example of some degree of supply-demand co-ordination. The current approach lacks a focus on optimal nourishment, being primarily designed to create orderly marketing and stable pricing and returns for producers. These are all important objectives, but a more ideal system would look at optimal consumption to generate better health outcomes, rather than just focusing on current demand. This is a significant issue because all the supply managed commodities are animal products, and in general the population is overconsuming them for optimal health. Learning from the energy experience in Ontario (Winfield & MacWhirter, 2013), it may be unwise to just inject demand management into supply planning, suggesting the need for officially broader mandates and different institutional arrangements than exist with supply management.

What ideally does a DSC approach look like? A key part of data gathering is garnering a fuller understanding of what optimal consumption looks like on a regional population basis and how far away from that scenario a region is at any given time. Currently, we have only national and some regional food consumption estimates (see, for example, Desjardins et al., 2010; Ostry & Morrison, 2013). What percentage can be feasibly supplied by the region, given existing biophysical and economic constraints? In general, optimal diet means consuming more whole grains and pulses, less animal product and, more fruits and vegetables (especially coloured vegetables), fewer refined oils (away from soy, corn and palm oil and more toward olive, flax and canola), less sugar, and fewer processed beverages. Fish is a desirable part of the diet, but the state of the international and domestic fisheries suggests dietary requirements cannot be optimized.

What initiatives are required to better align production and consumption, and what supports can be provided to food chain actors to assist the transition? This effort to align production and consumption is also set within the context of wider land use planning issues such as agricultural land protection and minimizing losses to other uses[47]. There are significant public and private resources dedicated to projecting supply of key commodities, but Canada does not currently have good public data on crop rotations or regional linkages between crop and animal production. Equally unknown is the amount of high quality land producing foods of low utility for humans or with suboptimal production because land quality is compromised by conventional practices. These challenges are indicative of the kinds of new data collection requirements to make DSC work.

Mechanisms are required for setting prices and shifting agricultural production to align with regional priorities. Price setting is also required to minimize waste generating impacts of low priced imports that have historically created higher losses in domestic markets (e.g., cheap apple juice concentrate from China, see Proulx, 2014). Currently, price setting is only undertaken by a limited number of commodity marketing boards, so wider processes and instruments are

[46] Some of our future work will address this issue of urban planning, design and transportation.
[47] There are significant land protection and land tenure issues that we do not discuss in any detail in this paper.

required (see below). However, the federal government has significantly intervened in supply and demand dynamics in the past. During WWII, a wide range of structures and instruments were employed to shift production and consumption. These interventions were realized because the government recognized that the price system would not be capable of properly allocating resources amongst competing needs (Britnell & Fowke, 1962; Mosby, 2014).

Although an argument can be mounted that price failure is also widespread in the modern food system (on externalities and price failures, see Pretty, Brett, Gee, Hine, Mason, Morison et al., 2000; Tegtmeier & Duffy, 2004), the challenge is to identify tools that will have some acceptability in a traditional free market environment. Significant state intervention is more feasible when farmers rely extensively on state assets, for example, when leasing government land, the conditions of production can be written into the leases. The U.S. federal Cuyahoga Park in Ohio is one example of an approach that could possibly be replicated in the new national urban park in the Rouge Valley on the east side of Toronto (Dempsey, 2013).

Outside of such contexts, the interventions must encourage producers to shift volumes of individual commodities, but also between commodity categories. Such shifts must be undertaken in ways that respect environmental requirements related to crop rotations, animal densities and alignment of crop requirements with soil capabilities. A possible approach is to build on the Canadian tradition of single desk selling but organize it around common crop and rotational groupings rather than individual commodities: small fruit and melons; pome fruits; stone fruits; field crops and potatoes; vegetables; beef; pork; goats; and sheep. The supply-managed commodities – dairy, eggs, chicken, turkeys – would have their mandates modified (see below). Recent shifts in farm organizations – for example combining corn, soybean and wheat grower organizations in Ontario – suggest some sympathy for this approach. The single desk sellers would require that farmers use growing and processing protocols that meet resource efficiency requirements (discussed in earlier sections). These protocols would also regulate production for energy and plastics crops.

Specialty production (including grapes since they are primarily produced for alcohol in Canada) would not be included in DSC. The input sectors would also be largely excluded from the process, but would have to adapt to adjustments imposed by DSC, for example changes to seed production, hatcheries, breeding stock and genetics.

A possible model for prices setting is that used in the energy sector. The single desk sellers fix a minimum price for domestic suppliers and then everyone who wants to participate organizes to produce and deliver for that price[48]. This price reflects some cost internalization associated with environmental improvements and waste minimization. Those not wishing to participate can sell to international markets. This runs contrary to the previous iteration of the Canadian Wheat Board (CWB), but could retain some of its elements including price pooling. The price setting is designed to reflect both consumption and production requirements with health the ultimate purpose.

[48] Note that regulatory instruments to give authority to such approaches have been used in the past (see Britnell & Fowke, 1962).

In general, then, given current consumption patterns, animal products would be higher priced, fruits and vegetables lower. There would need to be internal transfers to balance returns to producers, so effectively price pooling across single desk sellers. This kind of price setting would violate current trade arrangements so this assumes that they have been redesigned (see MacRae, 2014). In this model, the single desk sellers do not take possession or own distribution infrastructure; rather, they create virtual market places where buyers and sellers meet, conclude their deals and set up the delivery process. All the deals go through their infrastructure which then allows for monitoring and research. The set price assumes a particular level of waste, one that declines over time. As such, it creates an incentive to do at least as well as the projected level so that net margins improve relative to the average. At this stage, many waste costs have been internalized and many technological efficiencies generated (see Efficiency and Substitution stage proposals).

This approach is loosely based on the Sacolão markets of Brasil. In this model, a variant on the ration shop approach, the state sets the terms of trade, including prices and then allows the private sector to make arrangements to assure their profitability within the parameters established by the state. The state owns and maintains the markets, but does not subsidize directly their operation. In this case, the market place is virtual. Many virtual markets already exist and supply managed commodities use sophisticated modelling to project supply and demand, so by the time this is implemented, the software should be well developed. Regional requirements could be modelled using Agent-based Modeling (ABM-GIS) (see Ghaffari, Bunch, MacRae, & Zhao, 2015). The regulations ensure that for covered domestic products, sellers must sell through the system. The price provides long term security.

Effective demand–supply management includes animal feed. Given changes to animal populations and feeds discussed in the efficiency and substitution phases, there would be significant shifts to hay and pasture acreage, though the animal reductions would make the shifts somewhat less significant. The orderly marketing boards would have to manage quota reductions[49] and coordinate the shift out of animal production to other kinds of production, and this would have to include coordinating the reduction in feedgrains.

In the ideal implementation of the hierarchy, the following would happen (Table 3). Significant work needs to be done to model the transition and transitional impacts of such changes, in combination with significant reductions in animal populations.

Consistent with the proposed waste hierarchy, there needs to be some coordination between human, animal and industrial applications. While human and animal crop uses would be governed by the single desk sellers (including crop by product sales for animal feed), industrial uses would not. In Canada, the production of biomaterials includes soy-based foam, composite building materials using agricultural fibres, and bioplastics in vehicle interiors[50]. However, industrial use contracts and sales would have to be registered with the single desk sellers for

[49] Proposals by opponents of supply management on how to do this are not suitable for a variety of reasons.
[50] From AAFC's categorization of bioproducts at: http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-product-sector/bioproducts/types-of-bioproducts/?id=1370636403932

information purposes. Non-food uses currently account for about seven percent of the value of agricultural production, excluding production for agricultural inputs (seeds, breeding stock, etc.) (Agriculture and Agri-food Canada, 2012). Unfortunately, it is not clear how this relates to land use patterns[51].

MacRae et al. (2010) set out the requirements for resource efficient biofuel production on organic farms and similar conditions would need to be elaborated for most industrial applications. Many applications are not well suited to a resource efficiency scenario, including human grain–based ethanol (too much energy expended to produce it, unless the grain is not suited to human and animal feed, usually a small proportion of production), and sugar beets as a feedstock for biochemicals. More resource efficient is lignocellosic residues for fermentable sugars and gasification, a precursor for fuel and biochemicals (plastics, solvents, adhesives, paints, dyes, pigments and inks). Unfortunately, most current bio-based plastics and chemicals rely on first generation feedstocks, mainly sugar, starch, plant oil and rubber (Carus & Dammer, 2013). Second generation feedstocks are more suitable (short rotation coppice of popular, willow, miscanthus) and fit with the MacRae et al. (2010) scenario, but capital costs and the challenges of enzymes (especially non-GMO) are currently significant. Third generation feedstocks, such as algae in closed vessel processes, are on the horizon.

Feedstocks need be grown on lands unsuitable to food crops, typically Class 5-7 land that does not qualify for specialty production, with attention given to competition with hay and pasture for animal feed. As animal production declines, considerable acreage may actually be freed up for industrial applications. Although Canadian numbers are lacking, on a global basis, industrial applications may account for only three percent of land use, with animal feed around 70% (excluding grazing) (Carus & Dammer, 2013). Of course, many crops have bi- or tri-modal uses. Oilseed crops produce oil for human and industrial uses and oilseed crush goes to animal feed. Therefore, reductions in one use will have impacts on the others as well. The so-called "opportunity biomass" can still fit within this new framework, whereas "purpose-grown" biomass requires more precise analysis. Also important is that certain biomass has competing uses. Barley straw, for example, is generally the most desired for cattle bedding and roughage. When it is unavailable, oat straw and wheat straw are next best. Flax straw and corn stover are less likely to be used[52]. Excessive removal of surface residues for feed, bedding or industrial applications can lead to soil erosion.

[51] The data released from the 2011 Census of Agriculture is too inexact to undertake land use estimates and the biomass index mapping and analysis identifies what might theoretically be available for opportunity biomass but not purposely-planted agricultural biomass.

[52] AAFC's biomass inventory mapping and analysis is in part helpful for these issues. http://www.agr.gc.ca/atlas/bimat

Table 3: Feedgrain shifts under a DSC regime (estimates triangulated from a range of industry sources and news reports)

Feed	Est. human / animal / indust – pharma allocation	More desirable scenario	Implications
Wheat	85/10/5	No domestic feed wheat production, only human varietes that do not meet human market requirements sold as animal feed. No industrial applications except straw for construction.	Feed wheat varieties only developed and planted for export markets
Barley	78/20/trace	More barley used for direct human consumption; significant declines in acreage for animal feed.	Need to change diet to increase barley intake (most currently used in alcohol production).
Oats (grain)	55/35/10	Animal feed for the horse (performance) and farm production (feed) sectors. Feed includes grain, straw and fodder. Oats likely a more suitable feed choice than many others from environmental perspective	Increasing human oat consumption is desirable from health perspective.
Corn	20/60/20	Major reductions in corn acreage, across both animal, human and industrial applications	Very few current corn applications meet ecological and health requirements. Shift to silage from grain corn.
Soybean	75 (oil from crush and beans)/feed-grade 15 (plus crush by-product) /10 (plastic, industrial oil, biodiesel)	Only use non-human grade beans for industrial applications, Crush residue is suitable for animal feed	Animal population reductions would result in significant acreage declines. Soybean oil not that good for human consumption.
Canola	40/50/10	90% is exported, so dramatic reductions in canola acreage to meet domestic crop rotation requirements is desirable	Farmers shift out of canola to other crops
Hay / fodder / pasture	0/99/emerging for fuel and biomaterials	Only spoiled hay for non-animal uses	The shift out of feed grains means ruminant feeding primarily on hay/fodder/pasture

Many animal products also have this multimodal use pattern since not all of a carcass is edible. For example, a beef animal is only about 55% human edible material, with the rest going to other purposes, including leather products. Edible rendered products include tallow and solids, inedible ones go into pet foods, meat and bone meal, biodiesel, soaps, grease and other lubricants, candles, rubbers, and plastics. This reuse of animal material dramatically reduces waste. Canada has lost some of its capacity to process secondary products (e.g., most tanning operations are now offshore), so this needs to be re-established.

The existing studies on optimal consumption suggest the following outcomes from DSC: reductions in production of field corn, soybeans, spring wheat, barley, canola, sunflower, dairy, beef, pork and chicken; and significant increases in pasture, hay and alfalfa, pulses, vegetables (except perhaps sweet corn, tomatoes), small fruits, grapes, pome fruits and stone fruits (Van Bers & Robinson, 1993; Desjardins et al, 2010). Some production would experience market and use re-allocations, such as greenhouse vegetables shifting from export to domestic markets, flax from industrial to human consumption, or oats from animal feed to human markets.

DSC likely has to be carried out under a combination of federal and provincial authority (enabling federal legislation exists for supply management), especially to address cross border movement of goods to equalize supply amongst provinces. Under the constitution, the provinces are responsible for private property and land use, and also for hospitals. Recent convention has health care as a joint federal-provincial responsibility.

However, the BNA Act (section 95) gives concurrent power to provinces and the federal government over agriculture. In case of a conflict, the federal government is paramount although production control for conservation is likely under provincial authority. Setting prices would appear to be under federal trade and commerce authority if natural resource goods (food might be so viewed) are traded beyond provincial borders. From earlier National Farm Products Marketing cases, the view emerged that the federal government can intervene in apparently provincial affairs, even if primarily provincially traded, when there is a national interest in regulating external trade (Bray, 1980), which there would be if trying to create a national demand–supply coordination system. At this stage, there is no obvious way to determine how the courts might decide such matters. Production waste might actually be considered provincial, but economic waste would be federal. Since the model proposed here uses the economic value of waste to drive compliance, federal authority might rule the day.

What follows then are proposals to change existing provincial (Table A3 in the Appendix) and federal legislation. These amendments could come forward as modifications to the existing legislation, or could be an Act that amends other acts.

At a federal level, the Farm Products Agencies Act[53] would permit a new category of agency, the National Food Demand-Supply Coordination Council, that establishes optimal demand and does supply calculations. This agency could be designed based on the lessons of similar structures and processes created during WWII to coordinate demand and supply (Britnell

[53] Available at: http://laws-lois.justice.gc.ca/eng/acts/F-4/page-1.html

& Fowke, 1962; Mosby, 2014). This would not require producer majority agreement as is the case for supply managed commodities, so those provisions in existing legislation have to be changed.

Sewage sludge and humanure application to land to close nutrient and energy loops

- **Sewage water, nutrient and energy recovery and distribution**
  Problems addressed: nutrient inefficiencies and recovery

At the redesign stage, sewage treatment facilities shift from being waste disposal locations, to water, nutrient and energy recovery and distribution centres. While there are now many tremendous examples of improved overall effectiveness regarding treatment and reduction of discharges,

> the public health and environment-based model of the 'traditional' wastewater treatment utility that evolved over the last 150 years has had as its principal objectives, to collect and transport human and industrial waste-water quickly and as far downstream as possible to central treatment works that could purify it sufficiently and cost-effectively so that when discharged, receiving waters would meet applicable environmental standard (National Association of Clean Water Agencies (NACWA), the Water Environment Research Foundation (WERF) and the Water Environment Federation (WEF), 2013, p. 5)

Within an agroecological framework, the focus shifts to closing the nutrient loops while sustaining or improving sanitation and public health objectives. For example, some analysts believe 100% recycling of P from waste systems will be required to avert a P availability crisis in the long term (Ashley et al., 2011). This objective would need to be implemented in association with many other measures proposed here that have significant P use efficiency and recovery dimensions (Cordell et al., 2011).

According to one report, examples of cross-cutting, functional goals for nutrient management include:

- maximizing the capture and reuse of waste stream nutrients;
- minimizing the energy used to process wastewater;
- minimizing nutrient release into the environment;
- minimizing alternations to the hydrological cycle;
- minimizing the release of GHG emissions from infrastructure; and
- maximizing economic benefits. (The Johnson Foundation, 2014, p. 5)

On a decentralized scale, households would need to be designed with urine separation and dry household solid waste systems, obviously with huge implications for household design, building codes and neighbourhood waste management systems. A key additional challenge is moving nutrients to farms. Given existing built infrastructure, such redesigns may only be feasible in the construction of new neighbourhoods and communities that are integrated with food production[54].

Financing the changes

Financing the transition can be considered at two levels: of the firm/institution and across supply chains. Although the firm/institution is typically taken as the unit of analysis, looking across supply chains is important. The costs of reducing food waste may be borne at one stage of the supply chain, while the benefits may accrue in another stage. Alternately, the costs may occur upfront, with the benefits, if any, resulting later. Finally, the reductions (and costs and benefits) may only result from collaboration among different supply chain actors. For example, farmers may seek to reduce waste by improving their storage facilities; however, if they do not have adequate market access or receive a suitable price for their additional crop, it may not be worth the investment (Rutten, 2013).

Firms and institutions

The policy and programme changes proposed here will, in many cases, impose new upfront costs on firms and institutions. Case studies suggest, however, that food waste reductions can, in many instances, produce substantial operational savings, or generate new revenue streams[55], especially if the waste reductions are captured early in supply chains (Gooch & Felfel, 2014). Gooch and Felfel (2014, p. 5) remarked "How many items must a retailer, manufacturer, distributor, or farmer sell to cover the costs borne from each item wasted or lost? To our surprise, this is a question that businesses typically cannot answer." WRAP U.K. (2014) estimated that the average firm could reduce operating costs by 15 to 20% and increase profitability by five to eleven percent. A full regulatory impact analysis is beyond the scope of this paper, but we provide here some scenarios that suggest what might be feasible.

Uzea et al. (2014) summarized the experience of a Tim Hortons' supplier that saved almost half a million dollars a year from a waste discharge reduction project, with corresponding significant savings in electricity, natural gas and water. The increased revenue for the plant also generated a substantial net increase in revenue for the government, in that the added taxes

[54] The possibilities have been explored in Magid, Eilersen, Wrisberg, & Henze (2006).
[55] Unfortunately, most studies have not taken account of O'Brien's (2013) warning regarding surplus accumulation so some of the revenue projections will be overestimates within our framework of analysis.

amounted to over $140,000. Government support to help identify the appropriate program for the firm to employ only amounted to $4000.

Augustana College[56], a small college of 2500 students in western Illinois, U.S., has figured out how to source a significant percentage of its food locally, send the food scraps back to those farms, and save money at the same time. Being in a semi-rural area has probably made it easier to set up these short supply-and-reuse chains.

Hospitals are receiving considerable attention because of the poor food quality and high waste levels. Hospital beds in Ontario cost about $1200 per day, but hospital food is only $6 to 12 per day. With labour and other costs, it comes to $30 to 35 per day (Wylie-Toal, 2013; Mintz, 2016). In many cases, 40% of the food served is returned to the kitchen. The premise is that greater patient satisfaction with food reduces waste. Hospitals could save money by eliminating items that are infrequently eaten or portions that are too big, providing patient menu selection, buying only from suppliers who will take back the packaging, using better food forecasting and performing regular tray audits. Following these reduction efforts, there might also be savings on the disposal side as two-thirds of hospitals put food waste in the regular waste stream and do not segregate for composting or other possibilities (Mior, 2009).

It has been suggested that waste savings can finance the improvements in hospital food service. Let us suppose that waste is cut in half, to 20%, resulting in an additional $1.50 in food available for consumption. Though difficult to quantify, that $1.50 could have multiple positive impacts. According to one case example from a Toronto hospital, improving the food ingredients and quality of the food would increase costs within that $1.50 projected savings (Mintz, 2016). It could improve health status of patients who are eating more and better and potentially reduce time in hospital. It might mean a reduction in food procurement costs, if patients do not eat more, and the portion sizes are made more appropriate. The same amount of food would be spread over more patients, also making labour expenses more efficient. Regarding waste disposal savings, approximately 17.3% of the hospital waste stream is organic waste, and non-hazardous waste disposal costs range from $71 to 116 per tonne (Ontario Hospital Association, n.d.). Ontario hospitals discarded an average of 0.22 to 0.67 kg of food and packaging waste per meal served (Strashok, Dale, Herbert, & Foon, 2010). Reducing this waste by half, however, only saves about $0.07 per day[57], because disposal costs are currently so low. With higher fees and ultimately a landfill ban, it becomes more feasible for waste disposal costs to finance food service improvements.

[56] Details available at: http://www.augustana.edu/x9085.xml

[57] By some estimates, food packaging waste is about one-quarter by weight of food waste weight. So, let us presume that disposal costs $100 per tonne and $17 of that is food waste. The average hospital site in Ontario has 140 beds (31000 beds divided by 224 sites). We assume 0.45 kg per meal served is waste and 80% of that is food waste, so 0.36 kg per meal. Reducing food waste by one-half means reducing the weight to 0.18 kg per meal. We also assume 95% bed occupancy on any given day. Three meals per day x 140 beds x .95 x 0.18 kg = 71.2 kg per day in saved food waste.

For food retailers, revenue from diversion of food waste to marketable products such as compost and biogas is another way of financing early stage transitions. See our estimates in Table 4 from research conducted on a major Canadian retailer.

Table 4: Potential costs of different waste management methods for a major Canadian retailer (authors' calculations from document analysis and interviews)

Potential Disposal Method Costs		
Method of disposal	**Cost $ (based on LCL figures for 1 period)**	**Potential Revenue Stream**
Landfill	$2,460	✖
Anaerobic Digestion facility	$2,385	✔
Composting facility (large scale)	$2,385	✔
On-site composting	$897	✔
Farm feed application/ Animal feed	$1,323	✔
Reclamation/Donations	$0	✖
Incineration	n/a	✖

However, later stage reductions in food waste will shrink these revenues, so great care must be taken to properly scale revenue generation initiatives and avoid the surplus accumulation inclinations of firms as described by O'Brien (2013).

Across supply chains

WRAP U.K. claims their initiatives have resulted in a reduction of 670,000 tonnes of food waste throughout the U.K., saving £700 million for consumers and £20 million for governments in 2012. They estimate that every pound (£) invested in Love Food, Hate Waste saves £500 (WRAP U.K., n.d.). "Many big brands have embraced this agenda, recognizing the commercial benefit. Less waste means less cost" (Gooch et al., 2010, p. 8). In another government-supported initiative in Europe, between the Institute of Grocery Distribution (IGD) and Cranfield University, farmers and small businesses are encouraged to "Sell More, Waste Less" by going through and evaluating the entire value chain's processes and performance in order to identify causes of food waste. The programme estimated that businesses are able to reduce their costs by

20% and increase their sales by 10% by adopting new ways of managing their value chains (Gooch et al., 2010).

Tupper and Whitebread (2011) conducted eight case studies on supply chain coordination and found a seven to one benefit to cost ratio, where the costs were largely the time spent on the project by the facilitator and the companies, and the benefits were company savings and avoided landfill taxes. Key coordination strategies included: regular meetings between suppliers and retailers; better forecasting; more precise ordering and more detailed order information and better ordering tools; changes to package design, size and colouring to facilitate communication between supplier, retailer and consumer; and pricing changes to move lower demand product.

It would appear, then, that many of the costs imposed by regulatory changes are recoverable, especially as waste disposal fees increase. How to finance demand-supply coordination requires thorough study, but given the way current Canadian marketing boards use levies on distribution or price setting powers, it would appear that many of these costs could be imposed on the market place as they are currently.

Conclusion

Food system waste is a significant indicator of system inefficiencies and its fundamentally unsustainable character, and much of it is readily avoidable. The ongoing pressure to increase production and yield performance makes little sense when so much of that production is wasted. Although some improvements are underway, they are primarily private-sector driven and voluntary, with features that are potentially counter-productive in the longer term, in part because current waste reduction frameworks are either not followed, are inadequate, or both. The most significant underlying causes of waste, and their structural linkages across supply chains are not a substantial part of the current discussion.

In particular, private and voluntary initiatives largely fail to address both overproduction of certain foods and overconsumption by significant segments of the population. It would appear that only state interventions can address such problems since reducing them runs counter to the rules of a capitalist food system. To date, Canadian governments have been minimally involved in waste reduction efforts, with no coherent and comprehensive strategy in place to improve food system performance.

Many of the initiatives proposed here build on existing legislation, regulations, structures and processes, identifying minor amendments that add food waste reduction to efforts in other sectors. We modified existing food waste reduction hierarchies to both extend our understanding of food systems and create better linkages across the food chain as it relates to waste generation. We employed a transition framework to bring temporal and resourcing order to proposals and offered some preliminary suggestions on financing implications. In our process of change, governments intervene to set new conditions that private and public actors must respond to, a regulatory pluralism approach that does not impose the burdens of change on one sector. What

we propose requires a collaborative effort across private and public actors, NGOs and eaters themselves. A summary of our proposed initiatives and their relationship to our food waste management hierarchy is provided in Table 5.

Table 5: Summary of strategies

***Hierarchy Elements* / Transition strategies**	***Level 1: Human edibles (resource efficient)***	***Level 2: Animal edibles***	***Level 3: Human and animal inedibles for industrial use***	***Level 4: Sewage and humanure***
General	Better data Targets	Better data Targets	Better data Targets	Better data Targets
Efficiency	Education campaigns	Expanding suitable feeds	Backyard, community, curbside compost	Sewer separation
	Food label changes		Increase tipping fees	
	Improving food donation		Improving Waste-free legislation	
	Technology changes		Improving deadstock handling	
	Packaging changes		Transition for rendering	
	Size and portion changes			
Substitution	Environmental protocols	Environmental protocols	Curbside collection MURBs and commercial	Land application
	Grading changes	Plate waste regulatory change	Landfill ban	New settlement systems
	Regulating processing varieties			Composting toilets
	Requiring sustainable procurement			
	Advertising			
	Design standards			
Redesign	Demand-supply coordination	Demand-supply coordination	Demand-supply coordination	Water, nutrient and energy recovery and distribution

The redesign stage is the least developed area at this point. In future work, we plan to delve deeply into demand–supply coordination in the Canadian food system. This work will involve a detailed review of government instruments and structures employed during WWII, the

only moment in which Canada actually had a sophisticated DSC system in place, with lessons for constructing a new apparatus to bring it into place again. The ultimate purpose is to make sure we optimize the value of what we already have.

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Appendix

Table A1: Possible modifications to the *Canadian Consumer Packaging and Labelling Act* (CCPLA) to ensure authority for food waste reduction interventions.

Canadian Consumer Packaging and Labelling Act **(WITH PROPOSED MODIFICATIONS IN BOLD CAPS)**

Packaging requirements established by regulation

- **11.** (1) Where the Governor in Council is of the opinion that there is an undue proliferation of sizes or shapes of containers in which any prepackaged product or class of prepackaged product is sold and that the effect of the undue proliferation of sizes or shapes is to confuse or mislead or be likely to confuse or mislead consumers with respect to the weight, measure or numerical count of a prepackaged product, **[OR CONTRIBUTE TO LUXUS CONSUMPTION OR FOOD WASTE]** the Governor in Council, on the recommendation of the Minister, may make regulations establishing packaging requirements that limit the sizes and shapes of containers in which that prepackaged product or class of prepackaged product may be sold. **[EQUALLY, IF THE RANGE OF SIZES OR SHAPES ENCOURAGES MANY CONSUMERS TO BUY MORE THAN THEY NEED, THEN THE GOVERNOR IN COUNCIL CAN REQUIRE THAT SMALLER SIZES BE USED[A]. THE GOVERNOR IN COUNCIL MAY ALSO PASS REGULATIONS TO ENSURE USE OF NEW PACKING TECHNOLOGIES THAT MINIMIZE FOOD WASTE, SEE PREVIOUS SECTION.]**
- *Marginal note: Advice for establishing packaging requirements*

  (2) For the purpose of establishing packaging requirements for any prepackaged product or class of prepackaged product, the Minister shall seek the advice of at least one organization in Canada of consumers and one organization of dealers in that prepackaged product or class of prepackaged product and may seek the advice of the Standards Council of Canada or any organization in Canada engaged in standards formulation.

[a] Such regulatory amendments could appear under the Processed Products Regulations of the Canadian Agricultural Products Act, http://laws-lois.justice.gc.ca/eng/regulations/C.R.C.%2C%5Fc.%5F291/FullText.html

Table A2: possible modifications to the Ontario *Farm Products Sales and Grades Act* to encourage food waste reduction

Ontario Farm Products Sales and Grades Act **(WITH PROPOSED MODIFICATIONS IN BOLD UPPERCASE)**

Regulations

2. (1) The Minister may make regulations,

1. designating as a farm product any farm product or a class thereof or any article of food or drink manufactured or derived in whole or in part from a farm product;

2. establishing grades for a farm product;

3. providing for the inspecting, grading, packing and marking of farm products;

4. respecting the buying, selling, advertising, handling, shipping and transporting of farm products **[UNDER THIS PROVISION, THE PROVINCE COULD FORBID BOGOF AND REQUIRE BOGOF-L]**

5. respecting packages for farm products; **[REFLECT CHANGES TO THE CCPLA PROPOSED IN TABLE 3, FOR EXAMPLE, UNDER THE STRUCTURE OF REG. 378 THAT WAS REVOKED IN 2011]**.

6. prescribing the manner in which sellers, transporters and shippers of farm products shall identify, for purposes of grading, individual producer's lots in a shipment;

7. prescribing the manner in which shippers or packers shall make returns and prepare for presentation to the producer the statements of accounts of purchase of farm products and for the investigation of such statements and the transactions represented thereby; **[USE THIS TO FORBID LAST MINUTE CHANGES TO ARRANGEMENTS BY SHIPPERS, PACKERS AND RETAILERS; ADD A CLAUSE TO THE EFFECT THAT ORDER REDUCTIONS WITHIN 24 HOURS CAN ONLY BE PERMITTED BY THE AGREEMENT OF BOTH PARTIES]**

Table A3: Changes to provincial legislation to enable construction of demand-supply coordination structures and mechanisms, with Ontario as an example

Under the Ontario *Farm Products Marketing Act* **(PROPOSED CHANGES TO SELECT PROVISIONS IN BOLD UPPERCASE)**[58]

Purpose of Act

2. The purpose of this Act is to provide for the control and regulation in any or all aspects of the producing and marketing within Ontario of farm products including the prohibition of such producing or marketing in whole or in part. R.S.O. 1990, c. F.9, s. 2. **[THE ACT ALSO PROVIDES FOR THE COLLECTION AND ANALYSIS OF FOOD CONSUMPTION**

[58] http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90f09_e.htm

DATA AND THE LINKING OF PRODUCTION, DISTRIBUTION AND MARKETING TO ACHIEVE MORE OPTIMAL FOOD CONSUMPTION AND ITS ASSOCIATED HEALTH IMPROVEMENTS]

7.1.25. providing for the establishment in connection with any plan, of **NEGOTIATING** agencies that may be empowered to adopt or settle by agreement any or all of the following matters:

i. minimum prices for the regulated product or for any class, variety, grade or size of the regulated product,

ii. terms, conditions and forms of agreements relating to the producing or marketing of the regulated product,

[THE ESTABLISHMENT OF VIRTUAL MARKET PLACES FOR THE EXCHANGE OF REGULATED PRODUCTS BETWEEN BUYERS AND SELLERS OF GOODS DESTINED FOR DOMESTIC CONSUMPTION]

[PARTICIPATION OF BUYERS AND SELLERS OF REGULATED GOODS WITHIN THE MARKET PLACE IS MANDATORY.]

Regulations vesting powers in local board

8. (1) The Commission may make regulations vesting in any local board any powers that the Commission considers necessary or advisable to enable such local board effectively to promote, regulate and control the producing or marketing of the regulated product, and, without limiting the generality of the foregoing, may make regulations,

(a) vesting in any local board any or all of the following powers,

(i) to direct and control, by order or direction either as principal or agent, the producing or marketing of the regulated product, including the times and places at which the regulated product may be produced or marketed,

(ii) to determine the quality of each class, variety, grade and size of the regulated product that shall be marketed by each producer,

(iii) to prohibit the marketing of any class, variety, grade or size of the regulated product,

(iv) to determine from time to time the price or prices that shall be paid to producers or to the local board, as the case may be, for the regulated product or any class, variety, grade or size of the regulated product and to determine different prices for different parts of Ontario
[ACCOUNTING FOR OPTIMAL NUTRITIONAL REQUIREMENTS AND DEMAND]

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Book Review

Cities and Agriculture: Developing Resilient Urban Food Systems

Henk de Zeeuw and Pay Drechsel (Eds.)
Routledge, 2016, 432 pages
E-copy at http://www.ruaf.org

Reviewed by: Zhenzhong Si, Jennifer Marshman, Simon Berge, Ning Dai, Tammara Soma, Bryan Dale, Karen Landman, John Bacher, Mashiur Rahman, Charles Z. Levkoe

Introduction

In an age when we are inundated with information, efforts that streamline that information—by sifting kernels of wheat from the chaff—are precious. Our reviews are intended to assist CFS readers faced with a growing body of material relevant to food studies. However, the standard book review process is ill-suited to the increasingly common edited volume, with large numbers of chapters written by multiple authors. A single review struggles to capture and reflect on the distinct themes and copious information that such volumes typically contain.

We are experimenting with alternative formats. This installment was initially conceived as a "community book review", where we sought reviewers with relevant experience to tackle the material in each of the chapters. Ten volunteers stepped forward, and even participated in a round of blind reviews of each other's work. The result is a collaborative effort that provides depth of analysis for each of the 15 chapters in this book, and some lightly ground grains of wheat for your digestion.

-Phil Mount, Associate Editor

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Chapter 1 — Urban Food Systems

Johannes S. C. Wiskerke

Review by Zhenzhong Si (University of Waterloo, Department of Geography and Environmental Management)

In the opening chapter of the book, Johannes Wiskerke provides a comprehensive and clearly-structured elaboration on the conditions that shape our food systems, as well as guiding principles for designing resilient urban food systems. Wiskerke insightfully points out the neglect of food on the urban agenda, and calls for a better understanding of food as a critical urban issue. For example, food provisioning and consumption in cities can significantly affect the economic viability, environmental sustainability, public health, and quality of communities. The author devotes most of the chapter to the discussion of four major themes, which are also conditions shaping the food system: population growth, urbanization and changing diets; scarcity and depletion of resources; public health; and climate change. He then summarizes four guiding principles that will comprehensively address these conditions—adopting a city region perspective; connecting flows; creating synergies; and planning for resilient urban food systems.

The strength of the chapter is the integration of multiple issues, ideas, arguments and cases that create an overview of the urban food system, addressing theoretical and empirical themes. However, while adopting a city region perspective is crucial, the capacity of city level governments to redesign urban food systems should not be perceived as universal or equal, given that the administrative power structure varies in different places. The critiques of local food systems in agri-food studies, particularly the social justice dimension, deserve more attention in the depiction of urban agriculture's role in fostering urban development goals. Wiskerke offers a key takeaway message for readers: as a nexus that connects various urban policy domains and sustainability goals, the urban food system demands novel policies, urban planning, and governance agencies that aim to connect flows in waste management, and that create synergies by developing multifunctional urban food projects.

Chapter 2 — Urban Food Policies and Programs: An Overview

Lauren Baker and Henk de Zeeuw

Review by Jennifer Marshman (Wilfrid Laurier University, Centre for Sustainable Food Systems)

Before refrigeration and motorized transportation, cities were inextricably tied to food production. Proximity to the point of consumption meant a reduction in travel time and spoilage. As industrialization and global trade grew, urban ties to agricultural interests weakened and global food markets dominated, increasing the distance between producers and consumers. It is

increasingly evident to municipalities in both developed and developing countries that this global food system is linked to some of the most pressing urban issues today: "urban food insecurity, hunger, the increase of diet-related chronic diseases, the growing dependency on … large scale supermarket chains, and the growing vulnerability of the urban food system" (p. 26).

Authors Baker, a policy specialist with the Toronto Food Policy Council, and de Zeeuw, a senior advisor in agricultural development and founding director of RUAF, are perfectly situated to provide an in-depth analysis of policy development in this area. While a comprehensive review of all policies and programs across the globe would be impossible, Baker and de Zeeuw have compiled a number of the most relevant, recent inventories of policies and programs of urban food systems from the United States, Canada, and Europe. This, combined with a review of several broad publications from the work happening in developing countries, led them to identify four main objectives that focus on the social, health-related, economic, and ecological dimensions of urban
food policies.

What follows is organized using these four objectives as guides to navigate through specific examples from cities around the world. For anyone with an interest in urban agriculture policy and/or advocacy, the following eighteen pages provide excellent entry points for an ongoing exploration of these issues. Through the examples, it is evident that policies are beginning to move away from a micro level organization (individual and community) towards a more meso level of adoption (community, municipal, and regional). To ensure ongoing growth and effective governance in this urban food policy arena requires strengthened linkages across levels of government and a move towards macro level integration and incentivization of municipal food policy development. The authors point to the next chapter for a discussion of what good governance in this area would look like. They call for better measurements of the real costs and impacts of urban agriculture in order to justify investments in this area.
The authors have largely and successfully introduced examples of global policies and programs which address the urban issues that motivated this review.

Chapter 3 — Process and Tools for Multi-Stakeholder Planning of the Urban Agro-Food System

Henk de Zeeuw and Marielle Dubbeling

Review by Simon Berge (University of Winnipeg, Business Chair of Cooperative Enterprises)

This chapter presents experiences gained in multi-stakeholder planning of agro-food systems for communities, cities, or regions of the global North and South. Three planning approaches are presented: 1) policy vs. action, 2) top-down vs. bottom-up, and 3) mainstream vs. alternative. The authors then present a process for planning local/city-region agro-food systems, suggesting

that any such process is non-linear. The authors indicate that these chaotic processes require planning that fits the specific local/city-region, outlining five phases of planning: 1) getting started; 2) assessment of the current agro-food system in the city region; 3) multi-stakeholder dialogue and strategic planning; 4) formalization, operationalization and institutionalization of the proposed food and agriculture policies; and 5) implementation, monitoring and renewal of the strategic agro-food plan in the city region.

Details on the process are meant to help the reader in implementing a multi-stakeholder agro-food system. The three planning approaches provide a context for the process, while the five phases detail the process. The latter are presented via questions to guide the reader through the phases, incorporating multiple stakeholders in the process.

The chapter offers a great deal of useful material for planners, including a detailed, comprehensive process for urban agro-food system planning. While the approach does not provide a means to differentiate between agro-food systems in the global North and South, nor any environmental, economic or social cues to assist the reader in determining which tools to use in what setting, the authors note the challenge of applying their methodology in city-regions with fewer resources.

The chapter offers a great deal of detail that could also be used to assess and monitor an existing and sophisticated agro-food system. The authors conclude the chapter by outlining challenges for practitioners and academics, which include: a need for comparative assessments; more rigorous documentation of methods and implementation; more integration of community-based and planning-led approaches; adaptation of this approach for resource-poor cities; and a need for monitoring and evaluation indicators.

Chapter 4 — Agriculture in Urban Design and Spatial Planning

Andre Viljoen, Johannes Schlesinger, Katrin Bohn and Axel Drescher

Review by Jennifer Marshman (Wilfrid Laurier University, Centre for Sustainable Food Systems)

Urban Agriculture (UA) is not simply an historical activity (Victory Gardens), or an activity of relevance only in developing countries. While UA is not necessarily a “large and visible presence”, as the authors state, it is growing in popularity in cities around the world and can significantly impact urban spaces (p. 101). Particularly in the context of developed countries, UA remains largely hidden in backyards. This is most likely due to prohibitive bylaws and policies which restrict UA activities in urban settings. However, as the authors indicate, growing awareness of the benefits of UA is culminating in increasingly permissive policies over the past couple of decades.

This chapter describes an impressive array of examples of UA in urban planning through an extensive review of the literature. The many iterations of UA are discussed and outlined

throughout the chapter, with a particular focus on land tenure, integration, and scale. For example, the authors argue that building UA capacity directly into new developments is key to successful and efficient urban integration. One example of this success is the extensive rooftop greenhouse on a new development in New York City, which is expected to yield 80,000–100,000 lbs. of fresh food each year (p. 113).

Examples of the need for, and implementation of, "green infrastructure and multifunctional landscapes" are also provided (p. 90). The authors discuss key theoretical concepts—space, tenure, environment—and also provide practical examples from both developed and developing countries. The latter illustrate both the requirements for the successful integration of these projects into urban spaces, and the feasibility and desirability of such integration.

The authors have managed to talk about urban planning in an engaging and accessible way, for those of us without a planning background. Extensive photos, more so than any other chapter, provide a much needed visual texture and depth to the examples provided. There is still a lot of integration needed to make UA an inherent component of urban planning, but a major shift in thinking is taking place. Some of the examples of urban planning measures are brief, but still provide a solid starting point for new researchers. With UA increasingly linked to other urban planning concerns, including urban population growth and global climate change, UA is increasingly found on planning agendas. The authors end with a call for a "conceptual shift" to ensure that efforts can be focused and consolidated (p. 117), and lead to increasing growth and inclusion of UA in urban planning.

Chapter 5 — Urban Agriculture and Short Chain Food Marketing in Developing Countries

Paule Moustier and Henk Renting

Review by Ning Dai (University of Waterloo, Department of Geography and Environmental Management)

This chapter sheds light on the status of urban agriculture and short food supply chains (SFSCs) in the Global South. Despite the progress made, urban agriculture and SFSCs are now faced with new challenges. The rise of industrial farming and supermarkets formed intense competition by price advantages and dispersed outlets. In response to the increasing competition, a host of innovative SFSC models were created to reinforce the connection between urban farmers and consumers. A research gap was identified in the end, which called for more detailed quantitative accounts of urban agriculture and SFSCs.

In my mind, quantitative research needs to be combined with qualitative studies that capture the ingenuity and motives of urban farmers through real world interactions. Although economic data is often preferred by policy makers, the suggestion to generalize social and

ecological benefits with an economic index is too limiting. While economic returns are commonly used to evaluate the success of business models, I believe that social benefits will be better represented through the words of urban farmers and entrepreneurs rather than an estimation derived from survey data by outsider researchers.

The chapter focused mainly on the supply-side initiatives, and future studies could complement the research findings with an analysis of the demand-side attitudes. Throughout this chapter, readers will be impressed by the prevalence of urban agriculture among cities in the Global South and the socio-economic benefits to their inhabitants. Readers will also appreciate the role of urban agriculture in SFSCs, and how initiatives emerged in response to corporatization and supermarketization.

Chapter 6 — Urban Agriculture's Contributions to Urban Food Security and Nutrition

Maria Gerster-Bentaya

Review by Jennifer Marshman (Wilfrid Laurier University, Centre for Sustainable Food Systems)

Since 2008, more people have been living in cities than ever before, and millions of urban residents are taking part of some form of Urban Agriculture (UA). UA can address multiple issues in expanding urban centers, including the growing or emerging issues of obesity, malnutrition and food insecurity. The chapter begins by acknowledging not only what we would traditionally consider to be malnutrition (under-nutrition), but also the emerging issues of micronutrient deficiency and over-nutrition—each with its own unique health consequences.

The chapter is laid out as follows: a discussion on urban food security and a review of the literature on how UA can help to address this complex issue. A balanced view provides insight into both the risks and benefits of UA, ending with remaining challenges that need to be addressed. The "nutrition" aspect is less comprehensively covered than the concept of food security itself. The author provides a big picture view with a few examples of specific cities, as well as a short summary of the coping strategies for dealing with food insecurity, including changing diets, finding alternative food sources, and redistributing household budget allocation.

A discussion about UA as a means of improving access to food and increasing resilience, is followed by a critical look at the risks associated with UA—including uptake of heavy metals and ingestion of pathogenic organisms. Some of these concerns are being considered by planners and health officials who are beginning to promote UA in various forms. For example, Toronto Public Health has developed a guide for people wanting to grow food at home called *From the Ground Up: Guide for Soil Testing in Urban Gardens*.

There is a particularly eye-opening table provided on page 147 which shows the percent of food provided through UA in cities around the world. Even though the sources are dated, the

numbers indicate both the possibilities and the need to investigate the kinds of changes that have taken place over the past two decades. For example, Shanghai is growing a significant proportion of their vegetables, eggs, poultry, milk and pork. With a population of nearly 17 million at the time of the survey, this indicates that even densely populated urban spaces are capable of significant food production. This is important as global cities and megacities continue to grow and expand.

This chapter acknowledges the need for productive collaboration and policy at all levels for UA initiatives to "create favourable conditions for the development of an urban food system that provides safe and nutritious and affordable food to…the urban population" (p. 155). The author provides you with an extensive reading list and a solid base from which to continue to explore this topic.

Chapter 7 — Productive and Safe Use of Urban Organic Wastes and Wastewater in Urban Food Production Systems in Low-Income countries

Pay Drechsel, Bernard Keraita, Olufunke O. Cofie, Josiane Nikiema

Review by Tammara Soma (University of Toronto, Department of Geography and Planning)

As a growing number of low-income countries undergo urbanization, issues of urban food insecurity and the need for better management of urban waste have increasingly come to the fore. The chapter by Drechsel, Keraita, Cofie, and Nikiema has attempted to shift the paradigm from viewing waste as a risk/hazard into one that views urban organic waste as a valuable source of nutrients.

The chapter focuses on the potential of human excreta, urine, wastewater and food waste as a source of nutrients in agriculture. The authors argue that utilizing these wastes will also lead to waste reduction in open, non-engineered landfills in low-income countries.
The forecast of "peak phosphorus" means that there will be a growing need for alternative fertilizers. Both fecal matter and urine contain phosphorus, as well as nitrogen and potassium. Key recommendations gleaned from the chapter include the need to improve the safety of these nutrient sources, acknowledge the benefits of processing human excreta into fecal sludge pellets, and change the public stigma around using fecal waste.

A strength of this chapter is its recognition of the importance of developing locally appropriate laws that will encourage the safe use of these resources. However, several weaknesses limit the effectiveness of the chapter. The authors' use of the term "food waste" to define cotton husks, poultry manure and human excreta alike is problematic, as these are very different waste streams with separate—as well as non-urban—sources and issues. The chapter

would benefit from a stronger focus on one waste stream instead of these various organic wastes: there was more to be said, but the message was diluted.

Similarly, while the authors outlined the benefits of using human excreta, urine, and wastewater for urban agriculture, the chapter did not sufficiently prove the feasibility of using these waste streams. It is unclear whether the benefits of using these waste streams outweigh the potential harms, risks, and challenges that would be faced by urban farmers with scant resources in low-income countries.

Chapter 8 — Urban Agriculture and Climate Change

Shuaib Lwasa, and Marielle Dubbeling

Review by Bryan Dale (University of Toronto, Department of Geography)

In this chapter, Lwasa and Dubbeling provide a helpful overview of the state of urban agriculture in relation to the climate crisis. Drawing on academic literature and studies that have taken place around the world, the authors discuss the challenges and opportunities for urban agriculture in the context of ongoing environmental change. Beginning with a re-cap of the climate-related problems facing city governments and residents—from storm surges and landslides to an exacerbated urban heat island effect—Lwasa and Dubbeling draw particular attention to the innovations that will be required in countries of the global south, where infrastructure challenges already abound. They then discuss the potential benefits of urban agriculture for climate change adaptation and mitigation. Amongst others, adaptation benefits include the capacity of city-based farms and gardens to help reduce runoff following rainstorms, thereby lowering the risk of flooding hazards. Mitigation benefits range from carbon sequestration, through effective soil management and agroforestry, to reduced emissions that can result from producing food closer to consumers, and employing techniques such as reusing organic waste.

On the whole, this chapter does a good job of summarizing an extensive literature that links urban agriculture and climate change, while illustrating key points with examples from projects taking place in cities around the world. However, although there is mention of studies that have taken place in New York, Toronto and Seattle, for example, the authors focus more on perspectives from the global south. The authors also focus more on technical details than the politics of implementing urban agricultural projects in socially just ways. They mention issues such as land conflicts and the importance of marginalized groups contributing to decision-making processes for urban governance, however a full treatment of the political ecology of urban agriculture in relation to climate change certainly seemed to be out of scope here, and likely merits its own book.

Chapter 9 — Urban Horticulture

Hubert de Bon, Robert J. Holmer and Christine Aubry

Review by Karen Landman (University of Guelph, Landscape Architecture)

Urban Horticulture aims to describe the major plant production systems, practices and constraints of urban horticulture, and new techniques that tackle the restrictions of urban crop production. Within the first page, a very limited list of edible plants found in urban environments is provided: however, of the eight "fruits" listed, only the strawberry grows in my native Canada—and only in the southern regions. This table seems unhelpful, as the edible plants grown in any given city will depend largely on climate and culture. The table also includes four ornamental plant genera. A thorough list of species used in urban horticulture throughout the world would be much more extensive than what we find here, but ultimately not particularly useful to the reader. Unfortunately, the first five pages and other parts of the chapter offer this sort of grab-bag information on disparate urban situations around the world.

The chapter becomes more helpful in outlining the negative factors influencing urban horticulture, and in providing examples of growing techniques used where resources are extremely limited, as well as where optimal resources exist. There are very real challenges in growing food in the urban environment but some of the challenges presented in this chapter are not global in nature—such as human excrement in irrigation water. Perhaps it would have been more helpful to focus on urban horticulture in developing countries, where institutional support might be less than what is needed to provide safe irrigation water and routine soil testing. The authors move quickly from one challenge to the next without much discussion on problem solving, or on the policy context—or lack thereof—for the varied environments from which they draw examples.

Greater editorial rigor could have honed this chapter to deal more clearly and particularly with edible crop production challenges and solutions, while also qualifying the varying contexts of urban environments around the world.

Chapter 10 — Urban Livestock Keeping

Delia Grace, Johanna Lindahl, Maria Correa and Manish Kakkar

Review by Jennifer Marshman (Wilfrid Laurier University, Centre for Sustainable Food Systems)

Urban livestock is one of the more controversial debates affecting Urban Agriculture (UA). There are few people roosting on their fences—people tend to be strongly for or against urban livestock. UA in developed countries has been criticized in the literature as being elitist, unsanitary, and a poor use of urban space. In popular media, disputes over urban chickens

revolve around fears of noise, pests, disease, and attracting unsavory people and activities. Despite the controversial nature of the topic, the chapter follows a traditional format, outlining the risks and benefits of livestock keeping, as well as adding a view to the future.

A historical overview provides several fascinating facts to capture your attention, including the reason for an increase in urban dairying after the 1850s, and an outline of which American cities likely exist today because of their livestock-rearing origins.
For thousands of years, humans and food-producing livestock have lived side by side. The authors attribute a combination of the industrialization of agriculture (large scale and specialized) and a changing view of animals as dirty and disruptive to civilized people, as reasons for the decline in urban livestock keeping. Historically, cities across North America, Europe and Australia shifted away from urban livestock keeping. Zoning restrictions and new regulations were initiated globally, although less stringently enforced in cities in Africa and Asia where urban livestock keeping remains quite visible in some places. The discussion on risks is extensive but an assessment of the degree of risk—while mentioned in closing—is conspicuously missing. Considering that one of the primary barriers to urban livestock keeping is the perception of risk to human and environmental health (as stated in the conclusion), this warrants further discussion
and research.

Given that "ruminant livestock are a major contributor (18%) of global anthropogenic greenhouse gas emissions", a larger discussion about the effects and impacts on global climate change would have been useful. Also, there has been increasing concern about the health impacts (human and environmental) of consuming meat products. While this appears to be beyond the scope of this chapter, including a statement about the health impacts of meat eating and perhaps even the alternatives could have been a worthwhile addition. Lastly, there was no mention of animal welfare, which is disappointing given that movements such as pastured meat and organics are particularly concerned with ensuring appropriate treatment of animals. In all, the authors have provided a good overview of the nature of urban livestock keeping along with an extensive list of references from which to continue reading.

Chapter 11 — Urban (Agro-)forestry

Fabio Salbitano

Review by John Bacher (Environmental author, researcher and consultant)

In *Urban Forestry and Agroforestry*, Fabio Salbitano, Simone Borelli, and Giovanni Sanesi capture both the amazing accomplishments and daunting challenges of what they term *green infrastructure*. This, they stress, is a healthy and urgently needed alternative to "grey infrastructure ie. Human engineered solutions that often involve concrete and steel."

Most exciting are the vivid examples of practical and efficient green infrastructure that the authors find growing in "cities and towns of different size, culture and income." Some of the most exciting innovations are found in three cities in quite different parts of the world.

> Bogata, Columbia is pursuing upstream landscape conservation and restoration as an alternative to more conventional water treatment technologies. Ho Chi Minh City restored mangroves instead of building dikes in order to protect shorelines from storm damage. And a chemical factory in Texas, USA, built a wetland instead of using deep well injection to treat wastewater.

These examples are well selected, since the conventional grey alternatives of concrete and steel—such as doomed dikes—pollute groundwater and make floods more catastrophic in the long term.

The authors could have improved their contribution with an acknowledgment that many of their favoured approaches—although growing mercifully in popularity and application—have a very long and honourable, but conflict-filled history. One of the most revealing stories demonstrates both the benefits of green infrastructure and the often bitter conflicts involved in getting it accepted.

The Shilwald is the magnificent municipal forest of the Swiss City of Zurich, established in 1489. Originally providing "an affordable supply [of wood] for its citizens", the Shilwald is now a primordial nature reserve, which seeks to restore rare species such as the European Brown Bear. The Shilwald is a model for municipal forests around the world, inspiring both the founder of the US Forest Service, Gifford Pinchot, and the Canadian pioneer ecologist, Edmund Zavitz. And yet its founder, Hans Waldmann, was publicly executed in 1489. While greening infrastructure is an urgent necessity, it involves battles with conventional thinking often tied to the self-interest of the promoters of concrete and steel that it struggles to replace.

Chapter 12 — Urban Aquaculture for Resilient Food Systems

Stuart W. Bunting and David C. Little

Review by Mashiur Rahman (University of Guelph, School of Environmental Design and Rural Development)

By 2050, the world population is predicted to increase to 9 billion. Worldwide, aquaculture is important for food security and nutrition. Aquaculture is the fastest growing area of the world's food-producing sector, representing approximately 50 percent of global fish production. The authors begin the chapter by defining urban aquaculture and urban farming, and pointing to a growing scientific literature that indicates their important role in meeting the demand for culturally relevant animal protein in densely populated areas. The authors outlined different

existing fish farming systems, addressing prevailing management regimes and production risks. They also describe specific urban aquaculture production plans that are relevant for poor and marginalized populations, for food security, and for sustainable urban development. The aquaculture methods for land-based systems, ponds, multifunctional wetlands and cage systems are described, with each section followed by "Research in use" to show how these methods are applied in developing and developed countries' urban aquaculture farming. The authors also discussed aquaponics production systems—an integrated culture of hydroponics and aquaculture—in developing countries, though it was very brief. Because of limited space in the densely populated urban areas, aquaponics is attracting public interest.

The authors focused on urban aquaculture in developing countries, where rapid growth of population results in a need to produce more fish for food security and livelihoods. Bunting and Little outlined the opportunities and challenges for intra-urban and peri-urban aquaculture development in diverse conditions for poor and marginal groups. They also critically reviewed challenges and opportunities using a SWOT model (Strength, Weakness, Opportunities and Threats), which enriched and strengthened the discussion. Pollution control and inadequate wastewater treatment are identified as important factors that will affect the success of urban aquaculture, as they could cause fish death as well as environmental impact in urban areas. The authors conclude the chapter discussing how to promote urban aquaculture and support need through a STEPS (social, technical, environmental, political, sustainability) framework. They also recommended conducting cost-benefit analyses to evaluate the potentiality of urban aquaculture for a sustainable environment. The strength of this chapter is the discussion of different urban aquaculture systems for food resilience in developing countries, the strength and challenges, and how to promote the various types of urban aquaculture, taking into account their limitations.

Chapter 13 — Gendering urban food strategies across multiple scales

Liam Riley and Alice Hovorka

Review by Charles Z Levkoe (Lakehead University, Department of Health Sciences, Canada Research Chair in Sustainable Food Systems)

Liam Riley and Alice Hovorka's chapter analyzes the intersecting politics of gender inequality and food insecurity at multiple scales. The authors present an overview of literature addressing key issues at the individual, household, city, nation, and global scales to highlight the forces shaping urban food systems. Their analysis uses a 'feminist foodscapes framework' (Hovorka, 2013) in order to highlight power imbalances that maintain inequality within urban food systems. By addressing the structural disadvantages faced by women (relative to men), the authors aim to show the ways that gender is embedded across the scales of urban life, and expose it as a root

cause of inequality within the food system. Their approach aims to addresses immediate challenges of food access as well as longer-term strategic goals like food as a human right.

In the final section, Riley and Hovorka suggest ways that embedding gender across scales of urban life creates opportunities for improving gender equity within food systems. They emphasize the need to empower both men and women to embrace opportunities that politicize the gendered dimensions of food work. The discussion revisits the five elements of mainstreaming (see Hovorka & Lee-Smith, 2006) in respect to the multiple scales approach to gendering urban food systems. These elements include: Developing conceptual capacity "to make the necessary connections between power-laden fields of food and gender"; identifying practical and strategic needs and their interconnection across scales; developing political will and commitment among key stakeholders to address the structural causes of gender inequality; establishing more equitable resource allocation and better capacity building; and, improving research on gender dynamics to identify problems, connect issues and identify the connections between "practical and structural causes of gender inequality and food insecurity".

Overall, the chapter is extremely well written and presents an excellent summary of issues related to gender and urban food security—a subject too often ignored in sustainable food systems literature. In short, the authors present an approach that is fundamental to understanding and creating more resilient urban food systems. The primary downfall of the chapter is that it attempts to cover a significant amount of ground in a very limited space. Each of the major sections and subsections barley scratches the surface of the debates and materials available. Thus, this chapter presents a broad overview of this important topic and may either be considered an introduction to new readers or a summative overview for more experienced researchers and practitioners. There are however, a number of good references and case studies included in the text that point to further reading for deeper engagement. Absent from the chapter is any discussion of social movements that have positioned women at the forefront of struggle (e.g. women's movements, the right to the city, food movements) which are covered in other texts (see for example Barndt, 1999; 2008). Instead the chapter focuses primarily on top down policy options for change. While space was clearly a consideration in decisions on what to include and exclude, it is difficult to have a conversation about food system change without including the voices of those struggling for justice at the grassroots.

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Chapter 14 — Financing Urban Agriculture: What do we know and what should we know

Yves Cabannes

Review by Simon Berge (University of Winnipeg, Business Chair of Cooperative Enterprises)

This chapter seeks to define what kind of financial system is best suited to different types of urban agriculture. Four types of urban agriculture are presented: 1) subsistence-oriented; 2) market-oriented; 3) leisure and recreational; and 4) a combination of the three. The author suggests a need to focus beyond basic credit for urban agriculturalists, indicating that the financial tools should equate to: resource mobilization (monetary and non-monetary) + savings + subsidies + credits.

The complex nature of urban agriculture financing is presented through case studies and a literature review. From the case studies, the author suggests that it is imperative to understand the role of financial intermediaries within the system. Intermediaries define the financial products, and which urban farmers can gain access to them—the common types of financial intermediaries being 1) local government, 2) private and community-based, and 3) private banking systems.

The author concludes that there is no single standardized financial system for urban agriculture. A mix of financial instruments, taking into account the city's environment, is required to create the right financial system for urban agriculture. The author suggests that financing of urban and peri-urban agriculture is a major bottleneck in maintaining, expanding and scaling up the production of affordable, nutritious and accessible food
in cities.

The chapter presents a strong case for innovative financial products and the involvement of informed financial intermediaries in urban agriculture. The author clearly outlines the needs of urban producers for specific financial products that meet their production scale and timeframes. The chapter does not focus on Canadian urban agriculture, but the author outlines financial issues present in comparable urban agricultural systems. While the author does not present a single financial system for each type of urban agriculture, he clearly outlines the areas of future research that would lead us toward the answers.

Chapter 15 — Urban Agriculture and Emergencies/Disasters

Andrew Adam-Bradford and René van Veenhuizen

Review by Jennifer Marshman (Wilfrid Laurier University, Centre for Sustainable Food Systems)

Other than several of my hairstyles over the past decade, I am in no way an emergencies or disaster expert. With that said, I was very interested to read this chapter because looking at the role of Urban Agriculture (UA) in disasters and emergencies seems a novel approach or lens through which to view these activities. The chapter opens by claiming that—for disaster preparedness and recovery—UA can improve community resilience, improve disaster responses across scales (local, national, international), and prevent some disasters from occurring in the first place. These are big claims to make, and the authors make a valiant effort to provide evidence to support them.

The first few pages set the stage by briefly differentiating between disaster types and vulnerabilities. The focus is on developing countries with particular vulnerabilities and reduced capacity to respond following (human or natural) disasters. A critique of the traditional aid model opens a discussion about how combining immediate food distribution (food aid) with a food production plan (urban agriculture) is key to the success of long term resilience and capacity building of disaster impacted communities.

The Sphere Project is cited and described throughout the chapter, and guidelines from the project are outlined. Most importantly, these guidelines provide a framework for ensuring the "re-establishment of longer-term food security" (p. 402).

It is unclear why this was the chapter of choice to wrap up the book, but one thing is clear—there are important lessons to be learned from the many examples of food production following disasters that are happening globally. Several brief, but effective, illustrative examples are provided throughout the chapter. Perhaps it is an intentional foreshadowing of things to come, in the face of global climate change, and forecasts of peak oil and the collapse of the industrial food system. In that case, this is a fitting end chapter illustrating the important role of UA moving forward into an unknown future.

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Book Review

How Canadians Communicate VI: Food Promotion, Consumption, and Controversy

Charlene Elliott (Ed.)
University of Athabasca Press, 2016, 380 pages

Reviewed by Kathy Dobson, Fleur Esteron, Irena Knezevic, Agnes Malkinson, Scott Mitchell, Andrea Noriega, Chloe Poitevin DesRivieres, Julie Pasho, and Antonella Pucci (Carleton University)

Elliott's collection brings communication studies to the core of food studies, and this makes it a long-overdue book. While not all authors are communication scholars, the range of topics covered in the book are representative of how enmeshed the study of food and the study of human communication are. The title of the book alludes to a Canadian focus and many of the contributions deal with Canadian identities in relation to food. The subtitle, *Food Promotion, Consumption, and Controversy*, prepares the reader for the collection that largely deals with issues around consumption of food and food media, and its place in the economic system that underpins it. Though the quality of its seventeen chapters is somewhat uneven—with some appearing undercooked, and others baked to perfection—the collection as a whole makes for an interesting read.

Chapter 1, "Communicating Food Quality" by **Charlene Elliott and Wayne McCready,** offers appetizing ideas about how place of origin is deployed as a marketing strategy to promote quality goods. The authors depict product placement as a mechanism to communicate a sense of distinction and superiority in high-end foods. Elliott and McCready successfully build on this argument by unveiling how food and place form a co-constitutive union. That said, food and its

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processes are emplaced in a network of histories, social relations, nostalgia, sensory experience, and the imaginary. This chapter brings place studies into a savory but critical conversation about food marketing. It prompts the reader to consider the potential implications, but does so indirectly. If place is so powerful a communication tool in the marketing of prestige foods in terms of suggesting quality of ingredients, process, and nutrition, are these implicit claims always valid or truthful? What are some of the criticisms levied against geographic-certification organizations regarding the oversight, admittance and practices of their members? Still, this essay provides thoughtful explorations of the intertwining ways food and place engage readers with contingent examples of how place and its associated values interact with quality of food.

In **Chapter 2, "The Food Retail Environment in Canada" Jordan LeBel** demystifies the means by which food appears on the shelves of our grocery stores, and subsequently, on our plates. The essay provides valuable insight into how the retail food sector operates, the power it exerts within the Canadian food industry, as well as the choices that consumers make in the grocery aisles. LeBel draws out some of the challenges that retail food spaces face with changing consumer demands and increasingly aggressive competitors. This essay plainly illustrates the ways in which grocery store shelves are stocked, such as who makes decisions about what is available to consumers, what retail motivations are put forth, and to what extent marketing tactics are deployed. While LeBel makes a powerful argument about the need to expand the ways in which we talk about food, he fails to mention consumer skepticism of marketing messages by simply presenting consumers as complacent and susceptible to manipulation. A brief discussion on how consumers can exercise their power in making food choices would have been beneficial.

Chapter 3, "Selling Nutrition: Current Directions in Food Fortification and Nutrition-Related Marketing" by Valerie Tarasuk, is a compelling case for the limitations consumers face in making informed decisions about healthy eating. There are, the author argues, several factors involved in hindering consumers' potential to make healthy food choices. The main factor is that food manufacturers obscure nutrition information through the messaging, marketing, and front-of-package labelling they use in order to make their products more appealing to consumers. Another important factor is that consumers are not necessarily knowledgeable about what nutrients they need, in spite of the widespread availability of population-level information on nutrient requirements for Canadians. The shifting landscape of food policy, paired with outdated information for nutrition labels, has made it very challenging for consumers to appropriately assess their nutrient needs. Tarasuk convincingly suggests that the answer to making healthier food choices may not be more education, but a reform of nutrition labelling.

Eric Pateman and Shannon King offer a taste of Canadian culinary tourism in **Chapter 4, "Edible Canada—The Growth of Culinary Tourism"**. They chart the growth of the culinary tourism industry in Canada by focusing on companies like Vancouver-based Edible Canada,

which not only welcomes tourists and locals to taste food, but also delves into a deeper understanding of the food's regional context. While the chapter effectively explains the typical Canadiana experience of culinary tourism, such as exploring fresh lobster on the east coast, red meat in Alberta and local wines in the BC and Ontario regions, the authors fail to draw attention to Canada's diverse, diasporic nature—in particular, how immigrants and their descendants have created dishes inspired by their home countries that come to embody the new regions they inhabit. Aside from traditional regionalism that misses the diasporic diversity of Canadian food, Pateman and King make utopic arguments of how culinary tourism traces the food back to its roots, by providing stories about how the food is produced in local farmer's markets and bakeries. Nevertheless, their chapter fails to interrogate culinary tourism as another fetishized tool used to incite consumers to buy into particular notions of "authenticity".

In **Chapter 5, "*La cuisinière canadienne*: The Cookbook as Communication", Ken Albala** demonstrates how cookbooks do more than just teach consumers how to cook recipes; they are embedded with different cultural narratives that "implicitly promise a better life". Albala contends that cookbooks are used to empower individuals to embrace their identity and their heritage. From healthy living cookbooks embracing weight loss and conscious eating, to cookbooks containing traditional recipes once eaten by ancestors, these culinary texts weave in diverse narratives. In relation to the latter, Albala serves up a glimpse of how *La cuisinière canadienne* (Canada's first written and published culinary text in 1840) reveals unique and traditional Montreal dishes and techniques that date back to before colonial settlement. The recipes provided within *La cuisinière canadienne* function as a way of preserving the culture of a French-speaking population against a dominant English culture. By deconstructing *La cuisinière canadienne*, Albala dishes an insightful take on how cookbooks can be used as a form of communication, which romanticises a culture through food as a way to maintain a sense of identity.

Chapter 6, "The Dinner Party: Reworking Tradition Through Contemporary Performance" by **Jacqueline Botterill,** provides social and cultural insights into the traditional and contemporary dinner party. Botterill explains that historically, British and French *bourgeoisie*'s social position was communicated through curation of the dinner party. Honourable guests were invited and strategically seated, elaborate floral settings that complemented the table décor were deliberately arranged, and the dinner party moved throughout the home to showcase well-decorated rooms. Botterill proposes that the contemporary dinner party shows little resemblance to its traditional counterpart. Perhaps most interestingly, the contemporary party differs due to its use of the Internet: invitations are sent on Facebook, and recipes selected from websites. After the dinner party, photos are shared on social media in hopes of virtually continuing that evening's festivities. Botterill insightfully illustrates that in both traditional and contemporary dinner parties, food is secondary. Ultimately, this

chapter demonstrates that while the dinner party's function has evolved over time, its performance is indeed a hallmark of its time period.

"Why do audiences listen to radio programs showcasing conversations about food and eating, and how has food radio nourished Canadian listeners?" asks **Nathalie Cooke** in **Chapter 7, "Canadian Food Radio".** Regardless of its inability to provide the complete sensory experience of eating, the continued competition from American broadcasters, and the rise of multi-sensory television programming, food programming on the Canadian radio maintained its appeal throughout the twentieth century. Cooke reveals that the history of food radio programming and the history of women in Canadian broadcasting have been intertwined, with food programs having always been a mix of entertainment, education and product marketing. Key Canadian women broadcasters maintained authoritative status as they dispensed advice to homemakers, ensuring their programs were perceived as largely educational. Moreover, these broadcasters paid close attention to the diversity of regional cuisines in Canada, playing no small role in defining the culinary Canadian identity. The chapter, however, does not deliver clear answers to its opening questions. Instead, it feels somewhat like a visit to a museum, where the readers can find a bounty of artifacts from which to assemble their own answers.

From frosting and baking, to performed domesticity and hyper-masculinity, "**Of Men and Cupcakes: Baking Identities on Food Network" by Irina Milhalache (Chapter 8)** broadens the educational consideration of cooking shows. The content of *Food Network* shows—including who is cooking, how they are cooking, and what they are cooking—is culturally significant. The object of her inquiry is the cupcake, which Milhalache traces as a site through which chef identities are inscribed on food network shows. The cupcake represents an object that complicates the performance of gender. The chef's identity becomes fluid—just as fluid as the ingredients that can be mixed in and taken out of cupcake recipes. While *Food Network* shows may be less instructive and more entertaining, they are nonetheless learning experiences. The viewers are able to reflect on their own identity through the performance of the televised chef. Through sound argument and clear comprehension of Judith Butler's "gender performance", the author compels us to rethink the way we look at the cupcake. The cupcake itself invites playfulness for both the baker and the viewer, one in which the cupcake can be appropriated to comply to the performance of a "masculine" or "feminine" identity; and sometimes somewhere in between.

In **Chapter 9, "Snapshots of a Canadian Cuisine"**, **Elizabeth Baird** begins to answer the long-standing question of 'What is Canadian food really?' For Baird, it is four things: regional ingredients, distinctive cooking techniques, codification through cookbooks and 'heroes', and iconic dishes. As editor of *Canadian Living* from 1987-2009, Baird herself is one of these Canadian 'heroes'. She truly gives the reader "snapshots" of Canadian cuisines past, while guiding the reader to the present of Canadian food identity. Baird makes it clear that the nation's cuisine has particular distinctive qualities, and that some are so obvious that we hardly consider

their importance—we rarely think about baking, barbequing, and canning as "Canadian", but these have been major sites giving shape to our food identity and ingenuity. Baird invites the reader to contemplate the future of Canadian cuisine within the new media landscape of food bloggers and Canadian celebrity chefs.

Chapter 10, or John Gilchrist's "Everybody's a Critic: A memoir" presents an interesting listicle of the things he has learned over nearly four decades as a seasoned food critic. His tenure and multi-media experience as a food critic provides a refreshing narrative to a business that is fast becoming the territory of the every-woman/man. His essay contemplates both the history of Canadian food reviewing, and the democratizing effect of digital media on reviewing, which is increasingly making critical reviewers like himself irrelevant. Gilchrist equates the traditional way of restaurant reviewing with integrity. Although he does not explicitly criticize Facebook, Twitter, or blogs (and curiously neglects to mention other important digital food reviewer platforms, like Instagram and Yelp), he nonetheless implies that a certain kind of integrity has been lost. Gilchrist primarily reflects on the shift in food criticism; however, his references to Canadian celebrity chefs and their use of digital media platforms are particularly fascinating, and worth exploring for future research—as Baird signals, these culinary heroes shape Canadian food identities.

Catherine Carstairs, Paige Schell, and Sheilagh Quaile's "Making the 'Perfect Food' Safe: The Milk Pasteurization Debate" (Chapter 11) is an excellent overview of the history of milk pasteurization. The authors effectively chart the tensions between regulators and the medical community, who touted pasteurization as a crucial and necessary step for making milk products "safe", and the opposition from small dairy farmers who were pushed out of business by industrial-scale operations. The chapter presents the compelling argument that the mandatory pasteurization of milk happened not because of real health safety concerns, but rather as the result of a carefully crafted industry push to make consumers afraid of raw milk. In enforcing the mandatory pasteurization of milk, the government grants advantage to larger processors, since many small dairy operations are unable to afford the extra expense of pasteurization equipment. The chapter concludes that despite a recent interest in raw milk, and raw food more generally, this longstanding regulation is unlikely to change because of established "industrialized food systems". Without making explicit claims, the authors do seem to suggest that this system inherently and consistently favours the processors over the consumers.

Chapter 12, "Kraft Dinner® Unboxed: Rethinking Food Insecurity and Food" by Melanie Rock eloquently highlights a fundamental flaw in Canadians' charitable donations. Although well-intentioned, Canadians who donate Kraft Dinner® to food banks exacerbate the problems of our current (and broken) food system. The case study is an example of the 'Band-Aid solutions' that characterize the food bank system. Preparing Kraft Dinner® requires milk, and margarine or butter, as indicated by box instructions, yet low-income recipients of donations are often unable

to afford these dairy products. In fact, this product is a metaphor for the food bank system. Kraft Dinner® is palatable, but becomes a bitter disappointment to those who cannot afford dairy products. They are forced to eat something many would not consider "food", thus further de-humanizing their food bank experience. Kraft Dinner® is cheap. The physical act of donating and receiving Kraft Dinner® further excludes an already socially marginalized population—restating that they do not have the same privileges and rights as others. Although well-intentioned, the act of donating to the food bank further embodies the social and structural inequities faced by low-income populations.

In, **Chapter 13, "Hipster Hunters and the Discursive Politics of Food Hunting in Canada", Rebecca Carruthers Den Hoed** assesses the "hipster", and "utilitarian" (typically lower class and/or Aboriginal) hunter. The *hipster hunter* is set apart from the *utilitarian hunter*, as an elite group claiming to have found the "right" way or correct attitude towards hunting. The hipster hunter could help revive hunting across Canada by making it appeal to those who need to see hunting as something genteel or noble, and wild meat as more gourmet. But, by appealing to elite food tastes, this also creates a deepening of class division. The visibility of the hipster hunter becomes problematic, as the authors outline, as it buries the ongoing conflicts surrounding Aboriginal discourses of hunting and hunting rights. On one hand, the author is critical of food researchers and practitioners for their exclusionary focus on agricultural foods, and on the other, she critiques the ways in which certain hunter discourses overshadow Aboriginal peoples' decades of struggle. The resulting arguments are somewhat unfocussed and less than convincing. However, the chapter offers a compelling and effective examination of the tendency for research and discourse around hunting to stigmatize or overlook certain communities and practices.

Pierre Desrochers' Chapter 14, "Lies, Damned Lies and Locavorism", attempts to crumble the prevailing local food movement discourse. He asserts that food systems operate optimally and efficiently at a global scale due to unsuitable food production landscapes, dominant economic structures, and continual technological advancement in food production. He rejects the notion of "local" as socially just, economically and environmentally sustainable, and automatically promoting food safety and food justice. His critiques of the local food movement raise relevant issues regarding the effectiveness of localization as a means to create systemic and sustainable changes in the food system, even though the type of localization Desrochers describes (*defensive localism*) is an outdated viewpoint; local food scholars and advocates have long moved beyond this as they seek more reflexive and holistic strategies. By raising issues with locavore discourses, Desrochers attempts to refute the idea that the conventional food system is in need of systemic changes, and instead proposes solutions based on trade liberalization, technological advancements, and corporatization—the very "solutions" that ultimately led to the current unsustainable and unjust food system that locavores seek to change.

In **Chapter 15, "Communication, Crisis, and Contaminated Meat: A Tale of Two Food Scares", Charlene Elliott and Josh Greenberg** frame the perceived hazards of food poisoning as an area of public concern similar to growing fears around disease epidemics and terrorist attacks. Just as many scholars and commentators have ascribed fears and anxiety concerning these two major issues to sensationalized media coverage, the authors contend that part of the blame for the attention and worry around foodborne illnesses falls on the plate of the press. This chapter focuses on describing the political and economic fallout of various companies and agencies when there is a high-profile foodborne disease outbreak. Although the essay seems primarily concerned with the practices of news media in the beginning, there is little attention given to the signs and symbols present in news coverage of the two outbreaks described, despite the earlier discussion of their importance in shaping public understandings. Nonetheless, the authors' comparison of the Maple Leaf Foods and XL Foods incidents is an effective, well-written case study for understanding the how the risks that alarm people differ from the actual risks that may harm them, with communication strategies largely responsible for the differential perception of risk.

Stephen Kline's Chpater 16, "Canaries in the Supermarket: Moral Panic, Food Marketing and Children's Eating", examines *globesity*—or the so-called obesity epidemic—paying particular attention to the moral panic surrounding childhood obesity. Similar to Elliot and Greenberg's discussion of the Maple Leaf Foods and XL Foods incidents, this chapter is concerned with food risk and communication. Kline attempts to survey and connect the dots between a range of issues, from the 'medicalization of the adipose child's body', to moral panic about children's weight gain through inaccurate or misleading reporting, risk perception, blaming advertisers for indoctrinating children into unhealthy diets, and finally the effects of changing patterns of domestic life on eating behaviours. Although these are all doubtlessly connected—as Kline manages to demonstrate throughout the chapter—the sheer scope of this argument means that some aspects (such as risk perception) are not as fleshed out as others, and the chapter loses a bit of focus as a result. This is especially evident towards the end, when there is a shift towards a sociocultural analysis of contemporary lifestyle practices, family dynamics, and changing norms and behaviour regarding food consumption.

Chapter 17, "'Death on a Plate': Communicating Food Fears in Modern North America" by **Harvey Levenstein,** is an examination of fear and science communication, demonstrating how campaigns by food producers and sensationalized or misleading coverage by the media led to, for example, support for certain food regulations and the success of vitamin-enriched products. The main argument is that communications—through advertising and news media hype—both produce and "resolve" anxieties concerning food. Levenstein characterizes these as largely "technology-based fears" that are the result of a widening gap between food producers and consumers, a natural outcome of large-scale industrialization. Further, the discovery of vitamins and the *germ theory* of disease both served to move food choice beyond the realm of

taste and everyday experience, and into unfamiliar territory that requires expert opinion and government intervention to navigate. Levenstein effectively unpacks how the actions of food producers, government regulators, and journalists paradoxically create fears about the dangers of mass produced food, and assuage anxieties through the introduction of standardized inspections and safety guarantees.

In conclusion, ***How Canadians Communicate VI: Food Promotion, Consumption, and Controversy*** assembles a diverse range of material and voices at the intersection of food and communication, from advertising and promotion to journalism and policy. Some of the chapters are not as strong as the others, in some cases struggling to present focused, cohesive arguments, yet overall this is a strong volume that gives readers a broad tour through some of the most relevant issues at the intersection of communication and food. Despite the volume being somewhat uneven, many of the chapters connect to one another through various themes, arguments, or schools of thought, providing an altogether comprehensive account for anybody interested in communication practices and food systems. Readers will also be interested to know that the entire volume is available as a free pdf download from the University of Athabasca Press website.

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Book Review

Food and Femininity

Kate Cairns and Josée Johnston
Bloomsbury Academic, 2015, 222 pages

Review by: Jennifer Braun (University of Alberta)

Driven by a central question—"why do so many women care so much about food?"—Cairns and Johnston investigate the contemporary contours and connections between food and femininity, detailing the diverse ways these two things intersect and emerge in women's lives. Their research is done in a Canadian context where, they argue, food is used as a standard to judge a good mother, a responsible caregiver, a discerning consumer, a healthy woman, and an ethically minded shopper —standards that are not easy to achieve, particularly if time and money are scarce. Nowadays, given that food is so central in the lives of many North Americans, the increasing consumer concern over the unsustainable nature of the current food system, and the intensity with which feminine food standards are applied to women, this book is both timely and timeless, and illuminating for anyone interested in food and gender (which, in my opinion, and that of Cairns and Johnston, should be everyone).

Using data from detailed narratives obtained during focus groups and in-depth interviews with 129 food-oriented consumers in Toronto, Canada (109 women and 20 men) and a discourse analysis of popular food blogs and magazines, Cairns and Johnston outline why food and femininity remain intricately connected topics that require "open-minded kitchen table discussions as well as critical research" (p. 6). The book is organized around key sites in the performance of food femininities: shopping, mothering, health and body, politics, and pleasure. These food femininities, they argue, help us to better understand the complex ways that food and femininity are intertwined within contemporary consumer culture.

The first chapter introduces the reader to the authors' big research questions, motivations, and study methodology, while also providing a "quick and dirty" history of food, femininity and

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feminism. The next chapter eloquently lays the theoretical foundations and "conceptual toolkits" that inform the analysis. Their theoretical toolkit expertly and robustly pulls from interdisciplinary perspectives, including gender studies and feminist theory; critiques of neoliberal governmentality; and sociological approaches to culture, consumption and social change. Drawing from these theories, as well as the "living, breathing world of women and food" (p.18), they outline a social theory of *food femininities*.

Chapter three shifts focus onto their empirical research, examining the first key site in the performance of food femininities: shopping. In this chapter, the powerful feelings women have associated with the seemingly banal task of shopping for food are documented. Women, to the researcher's surprise, often emphasized the pleasurable aspects of grocery shopping, signalling the cultural associations between consumption, femininity, and care. Importantly, though, they also highlight that, for women living in poverty, grocery shopping can be a stark reminder of the difficulty of caring for one's family with limited resources. This contrast is an important theme throughout their book: feminine food standards, and food femininity more broadly, are both raced and classed, and profoundly shaped by access to economic and cultural capital.

Chapter four continues to explore the emotionally salient connections between femininity and foodwork, but shifts to feeding children. Analyzing diverse narratives of nourishing and socializing children through food, they again highlight the emotional potency of maternal foodwork. For this analysis, they build upon feminist scholarship of intensive mothering and social reproduction, showing how many North American mothers face a new maternal ideal: raising an "organic child" (p. 76). The "organic child" ideal is informed by neoliberal notions of individual responsibility, positioning mothers as personally responsible for shielding their children from the risks of the industrial food system.

Chapter five moves from the foodwork of child-rearing to food and the care of the self. In this chapter, the authors explore the workings of a new healthy eating discourse they call the "do-diet" (p.88), which frames women's eating through a lens of empowerment and health, rather than vanity and restriction. Critically, though, they lift the thin veil of personal choice embodied in the do-diet, noting that this discourse still demands diligence, self-regulation, and corporeal control. This contradictory discourse, they poignantly argue, is particularly challenging for women who encounter the do-diet from marginalized locations and face heightened fat-phobia and classed barriers to the idealized practice of "choosing health" (p. 20).

Chapter six explores yet another gendered site of caring through food, namely making ethical food choices to express care for other beings and the environment. Drawing specifically from conversations with women food consumers and food activists, they investigate how women think through the politics of food choices at an individual and collective level. Significantly, they find that the food activists reveal how the gendering of foodwork may be reproduced in the public sphere, where community gardens and food security projects are coded feminine and the realms of food policy and agricultural leadership are dominated by men.

Chapter seven takes on the difficult task of exploring the complex relationship between femininity and food pleasure, focusing on the pleasures of eating and cooking. They note the

tension between socially valued aspects of femininities explored in previous chapters (care, self-control, and ethics) and the prioritization of pleasurable food experiences as described by female foodies. Again, however, they also look at the class and race dynamics that shape the performance of foodie femininities, and complicate the emancipatory potential of freely embracing food's pleasures. The second half of the chapter examines women's ambivalent relationship to cooking, specifically the gendered distinction between "everyday cooking" and "leisure cooking", as well as the struggle to find pleasure in foodwork when money and time are tight.

In the eighth and final chapter, Cairns and Johnston return to some of the big-picture issues that emerge throughout the book. Drawing on insights from their participants, they attempt to outline their own vision of a feminist politics of foodwork. This ambitious vision includes: a respect for the meaning that women find in food and a careful effort to avoid devaluing women's foodwork as retrograde, and a commitment to structural critique and collective efforts to redress enduring inequalities. Further, building a feminist politics of foodwork, from their perspective, also means forging greater connections between feminist movements and food movements both within the academy and beyond.

Overall, this book was excellent and I would highly recommend it for anyone interested in the sociological study of food and/or gender. It is scholastically rigorous, but remains firmly grounded in the everyday, real life experiences of women who care about food. In addition to its thoughtful and careful theoretical analysis of the varied performances of food femininities, the authors helpfully provide readily relatable examples and anecdotes to illustrate their ideas. This had the effect of connecting both theory and practice in a seamless and engaging way.

Further, I particularly appreciated their recurrent use of the concept of "calibration". As the authors so nicely articulate, calibration is not just about the common tendency to position oneself within the "middle ground", but is analytically and politically significant because it helps reveal the sharp boundaries surrounding food femininities and persistent gendered social pressures. Throughout this book and elsewhere, it is clear that women continue to be judged and scrutinized for their relationship to food, despite post-feminist discourses of empowerment and choice. Under the social microscope, they argue, it is not enough for a woman to simply care about food; she must hit the "sweet spot", enacting a hegemonic femininity that shows she cares about food, but does not care too much. Usefully, the concept of calibration—woven throughout the chapters of this book—draws attention to patriarchal processes that make the performance of hegemonic femininity difficult to fully enact, involving a constant balancing act of effort, restraint, and self-consciousness.

On a more personal note, I am almost certain that, at some point in this book, (particularly if you are a woman), you will feel a certain resonance with or strong emotional reaction to a story, illustrative example, or salient observation, because the topics and ideas covered are at once analytically and politically significant, but also have the potential to be deeply personal, as food often is, and this is indeed a strength of this book.

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Book Review

Human Rights and the Food Sovereignty Movement: Reclaiming Control

Priscilla Claeys
Routledge, New York, 2015, 210 pages

Reviewed by Kaitlyn Duthie-Kannikkatt (University of Manitoba)

Critical discussions of human rights have featured prominently in the development studies literature (Charvet & Kaczynska-Nay, 2008; Engle Merry, 1997; Rajagopal, 2015). While many social actors have utilized human rights to advance their goals, the framework has also been criticized for its tendency to individualize struggles and emphasize legal dimensions of justice, while ignoring issues of power. Despite these critiques, rights discourse continues to resonate within the food sovereignty movement—"a transnational movement of rural social organizations that work towards achieving structural changes in the global food system" (Claeys, 2015, p. 1). Some activists and academics who align themselves with this movement are working to subvert simplistic understandings of rights in favour of a more dignified, community-rooted, and radical alternative approach that captures the attention of national and international legislative bodies, while remaining useful to grassroots struggles. However, the strategic utility of this approach is contested within the food sovereignty movement.

Priscilla Claeys' *Human Rights and the Food Sovereignty Movement: Reclaiming Control* offers a critical analysis of the tensions around human rights framing within the food sovereignty movement. Guided by her work as a former advisor to the UN Special Rapporteur on the Right to Food, Claeys details the evolution of rights framing around food, how "right to food" and "food sovereignty" frames have been mutually influential, and how they have affected policy environments at local, national, and international scales. Her nuanced navigation of the progression of rights discourse within the food sovereignty movement challenges the reader to

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grapple with some fundamental questions: Does a human rights framework dictate a particular economic and political model of organization? Is the use of a human rights framework de-radicalizing the food sovereignty movement? Or, have food sovereignty advocates successfully subverted the liberalizing, state-centering effect of the rights discourse in favour of an approach that resonates with demands for autonomy, collectivity, and community control?

The book begins by outlining the challenges posed by food sovereignty to the neoliberal expansion of capital. As transnational agrarian movements such as *La Via Campesina* have begun to frame food sovereignty as a right in and of itself, they have shifted the focus of international human rights discourse from the state to the community, emphasizing plurality and local autonomy. Chapter 2 explores the challenges involved in fighting for the right to food sovereignty at national and international scales. Two aspects underlie the framing of this right: internal food sovereignty and external food sovereignty. Its internal dimension recalls the right to self-government, positioning community sovereignty as a countervailing force to state sovereignty. Externally, the right to food sovereignty applies existing notions of sovereignty over natural resources to changing global contexts in which transnational corporations are compromising the economic independence of less powerful political actors. As a result of the advocacy of *La Via Campesina* and other food sovereignty movement actors, several national and international actors have moved to legislatively recognize both internal and external dimensions of food sovereignty, demanding alternative trade rules, legal frameworks, and participation mechanisms. The challenges involved in organizing internationally are examined in more depth in Chapter 3, with a review of the history of the *Declaration on the Rights of Peasants*. Within *La Via Campesina*, the Declaration represents a form of resistance to de-peasantization and an alternative framework for economic and social justice. As *La Via Campesina* has worked to have the Declaration institutionalized at the UN, they have succeeded in advancing an alternative conception of rights, emphasizing responsibility and the interdependency of people and nature.

Before discussions on the right to food sovereignty or the rights of peasants emerged at the UN, the dominant framing for tackling hunger was a "right to food" frame. This frame positions hunger as an access issue, and advances certain entitlements and/or structural changes in order to secure access to food for the vulnerable. Chapter 4 outlines the various ways of viewing the "right to food" frame while Chapter 5 draws together the three rights frames for comparative analysis. Claeys argues that frames are "contested, discursive, and strategic processes" (p. 97) out of which our notions of rights emerge. The "right to food" frame, she contends, has been shaped by other, more radical human rights frames, but still retains its essential insufficiently radical character. The "right to food" frame has failed to provide a space for critiquing capitalism and systemic inequality—issues that are central for food sovereignty movement actors. Ultimately, Claeys concedes that no frame can be wholly abandoned. However, one needs to be aware of how particular frames reflect particular economic models. Without sufficient space to articulate alternatives to dominant capitalist production models, the differences between frames may be irreconcilable.

Human Rights and the Food Sovereignty Movement is an excellent contribution to the study of agrarian movements and the discourse on human rights in the field of development studies. Academic readers will appreciate its deeply analytical approach, although those new to food sovereignty literature may find it challenging to follow the evolution of actors and ideologies that have informed this complex issue.

Claeys provides an interesting launching point for a deeper discussion around how social movements as a whole are subverting, democratizing, or decolonizing rights, and future studies may explore interesting parallels between Indigenous rights movements (Miranda, 2010) and food sovereignty struggles, drawing from Claeys' empirical work on the impact of civil society participation in framing international legal rights instruments. Furthermore, as the food sovereignty literature delves deeper into conversations around how our notions of sovereignty are shifting amidst expanding linkages between state power and transnational capital (Ong, 2007; Patel, 2009; Trauger, 2014), Claeys' work on human rights is an important contribution to understanding emergent forms of sovereignty. *La Via Campesina's* dual identity as both participant and subversive within international rights discourse is evidence of how critical social movements can meaningfully impact the content and potential application of legal frameworks. Claeys' analysis provides a useful framework for assessing the impact of social movements in shifting discourses, through fostering creative tension and advancing societal transformation.

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