

Pathways to Resilience:  
Obstacles and Opportunities for Small-Scale Agriculture and Local Food Systems in  
British Columbia

by

W. Matthew Dell  
B.A., University of Victoria, 2009

A Thesis Submitted in Partial Fulfillment  
of the Requirements for the Degree of

MASTER OF ARTS

in the Department of Political Science

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University of Victoria

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## **Supervisory Committee**

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Dr. James Lawson, (Department of Political Science)  
**Supervisor**

Dr. Kimberly Speers, (School of Public Administration)  
**Outside Member**

## Abstract

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Climate change will impact food systems around the world by creating new ecological threats to crops and challenging the massive energy inputs required by modern industrial agriculture. The severity of these threats suggests that British Columbia's food system is unprepared for the adverse effects of climate change. The province currently produces 48% of its food requirements, much of which is allocated to export markets, and expansion of this system will be difficult as only 1% of provincial land is considered “prime” farmland. One way to prepare a food system for climate threats is to enhance the system’s resilience. A resilient system can quickly adapt to new external problems while maintaining its structure and productivity. A resilient food system is built on three important attributes: internal strength, diversity and flexibility. While there are numerous policy options to enhance resilience, this thesis focuses on role of small-scale agriculture and local food systems. This thesis will argue that provincial and local governments in British Columbia should pursue policies designed to expand small-scale food production and strengthen local food economies, as these scales of agriculture offer a practical and politically feasible way to create a more resilient food system. To gather policy options that can achieve this goal, this thesis relies on ideas and insights gathered from sixteen interviews with a diverse group of small-scale farmers throughout B.C. These on-farm perspectives are then evaluated within the complex policy environment that impacts agriculture policy. Agriculture policy in B.C. is influenced by multiple variables, including established policies and financial investments that support large-scale and international agriculture, limited government budgets, challenging relations between provincial and local governments, and bureaucratic challenges with implementing and operating agriculture programs. Despite these challenges, there are numerous policy opportunities and partners that can help policies to support small-scale production succeed. This thesis analyses these obstacles and opportunities, and puts forward a comprehensive list of policy options organized by their political practicality.

## Table of Contents

Supervisory Committee.....	ii
Abstract.....	.iii
Table of Contents.....	.iv
List of Acronyms.....	.vi
List of Tables.....	.vii
Acknowledgements.....	.viii
Dedication.....	.ix
<b>Chapter 1: Introduction.....</b>	<b>1</b>
Introduction to Topic.....	1
Purpose of Thesis.....	2
Importance of Thesis.....	3
Background: Climate Change and Agricultural Resilience.....	4
Background: Small-Scale Agriculture.....	6
Research Methodology: Interviews with Small-Scale Farmers.....	9
Thesis Limitations and Delimitations.....	14
Organization of Thesis.....	15
<b>Chapter 2: Background: Climate Change and Food Systems.....</b>	<b>16</b>
Water Issues: Precipitation and Flooding.....	17
Water Shortages, Drought and Desertification.....	19
Glaciers and Snowpack.....	20
Rising Ocean Levels.....	21
Pests, Pathogens and Weeds.....	22
Frost and Pollination Problems.....	23
The Unpredictability of Climate Change.....	24
The Importance of Emission Reductions.....	25
Fertilizer Production.....	27
<b>Chapter 3: Current State Analysis: Weaknesses in British Columbia’s Food System.....</b>	<b>29</b>
Lack of Agricultural Diversity.....	29
Unstable Import Sources.....	30
Limited Farmland.....	32
Increasing Population and Aging Farmers.....	33
<b>Chapter 4: Exploring Agricultural Resilience: The Role of Small-Scale Agriculture and Local Food Systems.....</b>	<b>35</b>
Resilience Literature.....	36
External Cycles.....	38
Diversity and Resilience.....	39
Flexibility and Resilience.....	41
Information Networks.....	44
Diversity and Flexibility in Small Scale Agriculture and Local Food Systems.....	47
<b>Chapter 5 : Towards a More Resilient Food System : Policy Priorities.....</b>	<b>49</b>
Farmland Preservation.....	50
Reforming the Agricultural Land Reserve.....	51
Local Governments and Land-use Zoning.....	54
Zoning Issues.....	57
Other Farmland Policy Options.....	61
Policies to Support Small-Scale Agriculture.....	63
Access to Markets.....	64

Community Markets.....	65
Community Supported Agriculture.....	68
Infrastructure, Facilities, Equipment and Subsidies.....	69
Policies to Develop Sustainable Consumption Habits.....	73
Labelling.....	74
Organic Labelling.....	76
Location Labeling.....	81
Carbon Labelling.....	84
Education Opportunities in Public Institutions.....	86
Public Spaces for Agriculture.....	88
Food Waste.....	89
Training Farmers and Agriculture Education.....	90
Farm Education Programs.....	92
Extension Agents and Farm Reviews.....	93
Farm Mentorship Programs.....	94
Environmental Farm Plan Program.....	94
Transition Programs.....	95
Conclusion.....	96
<b>Chapter 6: Reforming British Columbia's Food System: Obstacles and Opportunities.....</b>	<b>98</b>
The Growth and Influence of International Agriculture.....	99
Support Programs and Subsidies for Industrial Agriculture.....	104
Financial Legacies.....	106
Policy Opportunities for the Local Food Movement.....	107
Organizational Challenges for the Local Food Movement.....	110
Bureaucratic Challenges.....	113
Government Funding and Provincial/Local Government Relations.....	115
Conclusion.....	119
<b>Chapter 7: Discussion and Analysis.....</b>	<b>121</b>
<b>Thesis Conclusion.....</b>	<b>135</b>
<b>Appendix A: Interview Questions.....</b>	<b>139</b>
<b>Bibliography.....</b>	<b>140</b>

## List of Acronyms

ALC – Agricultural Land Commission  
ALR – Agricultural Land Reserve  
AGLG – Office of the Auditor General for Local Governments  
BCAFM – British Columbia Association of Farmers’ Market  
BCAC – British Columbia Agriculture Council  
BCAITCF – British Columbia Agriculture In The Classroom Foundation  
BCLC - Boundary Country Livestock Cooperative  
BCSSFPO - British Columbia Small Scale Food Processor Organization  
CAIS - Canadian Agricultural Income Stabilization  
CETA - Comprehensive Economic and Trade Agreement  
COABC - Certified Organic Farming Association of British Columbia  
CSA – Community Supported Agriculture  
EFP - Environmental Farm Plan program  
FMNCP - Farmers Market Nutrition and Coupon Program  
GHG – Greenhouse gas  
IPCC – International Panel on Climate Change  
MIR - Meat Inspection Regulations  
NAFTA – North American Free Trade Agreement  
UBCM - Union of British Columbia Municipalities  
WTO – World Trade Organization

## List of Tables

<b>Table 1: Characteristics of Participants</b> .....	8
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## Dedication

This thesis is dedicated to my grandparents, Billy and Dolly Dell, who moved to the remote South Okanagan Valley in their early 20s to begin farming and create a better life for themselves and their family. My experiences growing up in this beautiful region, surrounded by farms, tractors, tall grass and big orchard fires, will always stay with me.

Thank you also to my beautiful wife Rebecca and son Corbin for your support and patience while I completed this time consuming and difficult project.

Lastly, thank you to all the farmers that were interviewed for this project. I truly appreciate the time you each spent to discuss agriculture in B.C. and for your honesty and openness during this process.

# Chapter 1: Introduction

## *Introduction to Topic*

The modern global agriculture system is one of the most efficient and productive industrial systems on the planet. Over the past century, food production has rapidly expanded to accommodate population growth, while dietary changes have increased the demand for high-emission products such as meat and imported produce. To facilitate this continued expansion, natural ecosystems have often been converted into new farmland, and technological advances and fossil-fuel energy have helped to push yield boundaries.

As agriculture systems evolve to meet human demands, external changes such as climate change and ecosystem destruction threaten the foundations of the global agriculture economy. Food systems in British Columbia and around the world should evolve to prepare for future environmental threats, but the complex network of consumers, producers, agri-businesses and governments that make up the global agriculture economy means that identifying problems and implementing solutions to these problems is increasingly difficult.

While food systems face numerous challenges, the focus of this thesis is on one of the most urgent and long-term issues: global climate change. Currently accepted research confirms that a warming atmosphere will create new problems for biological, social, economic and agricultural systems around the world.<sup>1</sup> Climate change is expected to impact food systems by creating new ecological threats to crops, such as flooding, drought, pest-invasion, and severe temperature fluctuations, and will challenge the massive energy inputs required by modern industrial agriculture.<sup>2</sup>

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<sup>1</sup> Information on the history of the global climate, the causes of modern warming, and the widespread impacts of warming can be found in the IPCC's fifth report: International Panel on Climate Change (IPCC), 2014: Summary for policymakers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability*. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1-32. [http://ipcc-wg2.gov/AR5/images/uploads/WG2AR5\\_SPM\\_FINAL.pdf](http://ipcc-wg2.gov/AR5/images/uploads/WG2AR5_SPM_FINAL.pdf)

<sup>2</sup> The term "industrial agriculture" is often used in reference to large scale, mechanized and environmentally unsustainable food production that provides a majority of the food consumed in Western nations. There is a

The severity of these threats suggests that British Columbia's food system is unprepared for the adverse effects of climate change. Key weaknesses in B.C. include low domestic production, limited and expensive farmland<sup>3</sup>, a lack of production diversity, high agricultural-related GHG emissions and a dangerous reliance on imports from regions highly vulnerable to climate problems.<sup>4</sup> The province only produces 48% of its food requirements, much of which is exported, and only 1% of provincial land is considered “prime” farmland, which makes agricultural expansion difficult.

### *Purpose of Thesis*

The purpose of this thesis is to develop a list of practical policy options that can help build a more climate-resilient food system in British Columbia. A resilient food system can quickly adapt to new external problems while maintaining its structure and productivity. Specifically, this thesis will focus on the role that small-scale agriculture<sup>5</sup> and local food systems can play to enhance resilience. This thesis will argue that policies designed to expand small-scale food production and strengthen local food economies offer a practical and politically feasible way to create a more resilient food system.

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large amount of research, including a host of popular books, movies, and academic articles that outline the environmental problems associated with the industrial model of production, and the difficulty the industrial food system will have reducing greenhouse gas emissions. For a general overview of these problems, see: Tony Weis, “The Accelerating Biophysical Contradictions of Industrial Capitalist Agriculture,” *Journal of Agrarian Change* 10, no.3 (2010): 314-341.

<sup>3</sup> Farmland in British Columbia is scarce comparative to neighboring Prairie provinces, or nearby American states such as Washington State, Oregon and California. For example, Alberta has 23 million hectares of qualify farmland. Furthermore, as British Columbia’s prime farmland is located near to key urban regions, prices of farmland are high. For example, Farmer #3 mentioned that land prices are \$100,000 per acre in the South Okanagan, while an acre of land is only \$10,000 20 kilometers south in Washington State. Alberta Ministry of Agriculture and Forestry, “Alberta Soil Information Centre,” [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/sag6903](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag6903) (Accessed November 15th, 2015)

<sup>4</sup> The IPCC estimates that agriculture emissions account for 10-12% percent of total global emissions. Information on British Columbia’s emissions is limited, although B.C. statistics show on-farm emissions account for 3% of total provincial emissions. This does not include any secondary emissions from energy production, transportation, manufacturing, storage or waste. Furthermore, B.C. emissions may appear low as the Province only produces 48% of its food requirements. British Columbia, Ministry of Environment, *Greenhouse Gas Inventory Report 2012, Victoria, B.C.: Government of British Columbia, 2012.* [http://www.env.gov.bc.ca/cas/mitigation/ghg\\_inventory/pdf/pir-2012-full-report.pdf](http://www.env.gov.bc.ca/cas/mitigation/ghg_inventory/pdf/pir-2012-full-report.pdf)

<sup>5</sup> Small-scale agriculture typically refers to farming on plots of land that are less than 10 acres. For the purposes of this thesis, small-scale is used partially as a size indicator, and partially to describe sustainable production principles in opposition to “industrial agriculture” as discussed above. For my purposes, small-scale primarily involves farms under 10 acres, including single crop farms (e.g. fruit farmers in the Okanagan), poly-culture farms, organic farms, community gardens, urban agriculture (e.g. container gardens), and small food processors.

### *Importance of Thesis*

Agriculture and climate change are broad and complex subjects that cannot be fully addressed in any single research paper. This thesis provides two unique contributions to the broader discussion on how governments can prepare for the expected impacts of climate change. First, this thesis proposes a set of policies designed to enhance resilience that are gathered from interviews with small-scale farmers in British Columbia. On-farm perspectives from B.C.'s small-scale farmers are vital, as many of these farmers are not represented by larger farm associations or agricultural lobby groups, and localized perspectives can help account for issues specific to a particular region, such as land prices and availability, weather and soil conditions, water availability, pest or deer problems, and economic/social conditions. More information on the interview process is found in the "Methods" section below.

While the interviews provide important insight into the policies and programs that can expand small-scale production and strengthen local food systems, there are significant political, financial, and social obstacles to agriculture policy reform. This thesis then analyses the obstacles governments may face as they try to implement the policies gathered in the interviews. This review includes an analysis of the entrenched policies and programs that support large-scale and export-oriented food production, the bureaucratic challenges associated with supporting small-scale farming, and the financial limitations faced by both local and provincial governments which limit their capacity to support agriculture. In addition to these obstacles, this review will also explore the political opportunities that can support specific policy reform initiatives, including actors and interest groups associated with the rapidly growing local food movement.

The policies gathered from interviews will be explored within the context of the various political obstacles and opportunities that exist, to create a comprehensive list of policy recommendations based on their political and financial "do-ability." This list is loosely arranged based on the political and financial challenges associated with each policy's implementation and the scale of anticipated opposition each policy may face. It is very difficult to predict accurately the political response to policy reform – politicians spend a great deal of time anticipating the reaction to policy change, and perceptions of new policies depend on myriad factors, including external economic and social

conditions that change over time. Recommendations on political feasibility are intended as a general guideline.

*Background: Climate Change and Agricultural Resilience*

In response to climate change, this thesis argues that an effective way to prepare British Columbia's food system for the destabilizing impacts of warming is to enhance the system's resilience. Redman and Kinzig define resilience as "the ability of a system to remain functionally stable in the face of stress and to recover following a disturbance,"<sup>6</sup> and this shall be the definition used in the thesis. A resilient food system quickly adapts to new climate-related problems and can find alternative ways to maintain productivity despite external threats. A resilient system will rely on innovative, science-based public policy to anticipate problems before they arise, and strong information sharing systems (e.g. between policy makers and food producers) to adapt quickly to new scenarios.<sup>7</sup>

Agricultural resilience is very closely related to the food security<sup>8</sup> and food sovereignty movements. Together, these movements share numerous goals, including the desire to build a robust and sustainable food system for the long-term. The resilience movement is unique as it focuses on the ability of a food system to adapt to unpredictable circumstances quickly, rather than to focus primarily on sustainability (low-emission production) or sovereignty (self-sufficiency). It is also likely that resilience will be one key feature of a secure food system, in addition to other "secure" characteristics such as healthy and low-cost food options. Research on other concepts of agricultural reform was outside of the scope of this thesis.

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<sup>6</sup> Charles L. Redman and Ann P. Kinzig, "Resilience of Past Landscapes: Resilience Theory, Society, and the Longue Duree," *Ecology and Society* 7 no.1 (2003): 2.

<sup>7</sup> Rosemary E. Ommer and the Coasts Under Stress Research Project Team, *Coasts Under Stress: Restructuring and Social-Ecological Health* (Montreal: McGill-Queens University Press, 2008), 433.

<sup>8</sup> Throughout this thesis I have made multiple references to Ostry, Mielwald and Beveridge's paper *Climate Change and Food Security in British Columbia*, which outlines how B.C. can achieve greater "food security." Ostry et al.'s seven goals for enhancing food security offer a "high level" view of the "complex matrix" that is the food system, but do not focus on issues "at the level of the farm." These seven food security goals should be seen as a companion to my work, rather than a conflicting approach. I have used some of the research presented by Ostry et al. for the background of this thesis. Aleck Ostry, Christiana Mielwald and Rachelle Beveridge. "Climate Change and Food Security." Paper prepared for the *Pacific Institute on Climate Change*. Victoria, University of Victoria, British Columbia, 2011.

The initial research for this thesis revealed that the majority of modern literature on resilience focuses on ecological and social systems.<sup>9</sup> To help define the meaning of resilience in a food system, this thesis presents a short literature review of scholarly research on social and ecological resilience, including select research on agricultural (e.g. on farm) resilience, and derived a set of resilience principles that can be applied to food systems. These principles are intended to be guidelines only, and are not intended as recommendations for governments. The final objective of this thesis is not an abstract exercise on applying resilience theory precisely to agriculture, but a set of politically feasible policy solutions to enhance resilience.

My analysis of resilience literature, as captured in chapter four, suggests that a resilient food system builds on three important attributes: internal strength, diversity and flexibility. In particular, to prepare for coming climate with optimal food security, governments (provincial and local) in B.C. can pursue the following three policy goals:

- 1) Increase domestic food production in order to boost B.C.'s self-sufficiency and offset the unsecure reliance on high-emission and climate-vulnerable imports.
- 2) Establish greater diversity in all elements of the food system including crops and production methods, seasonal diversity, urban/rural diversity, farm size, farmer age and consumption habits. Diversity builds redundancy into a system so that failures in one area (crop, region, import source, farm input) can be counterbalanced by stronger elements of the system.
- 3) Build flexibility by capitalizing on the natural flexibilities of farms, agri-businesses, and food retailers at different scales. This includes the unique adaptive capacity of small-scale agriculture and strong local food systems: these can complement the productivity associated with large-scale production and international agri-business. Greater policy coordination between policy makers and farmers, and between policy makers in peripheral areas to food (health, education, finance, environment, and community development) can also increase flexibility through more comprehensive policy solutions and quicker problem anticipation.

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<sup>9</sup> Lin's research confirms this notion: "Although the idea of building resilience has been studied in a broad range of ecosystems, from coral reefs to forests, this idea has not been well studied in an especially important system to human society: the agro-ecosystem. The development of resilient agriculture systems is an essential topic of study because many communities greatly depend on the provisioning ecosystem services of such systems (food, fodder, fuel) for their livelihood." Brenda B. Lin, "Resilience in Agriculture through crop diversification: Adaptive management for environmental change," *Bioscience* 61, no.3 (2011): 183.

*Background: Small-Scale Agriculture*

While many policy solutions can address the three attributes of a resilient food system, this thesis will focus on the role of small-scale agriculture and local food systems<sup>10</sup>. Other commonly discussed issues that impact resilience, but that are not covered in this thesis, include greenhouse gas (GHG) reduction strategies,<sup>11</sup> genetically modified crops, new protein farming technologies (e.g. land based fish farming), and the expansion of farming into previously unfarmed northern regions. Although small-scale agriculture and local food systems are similar goals, the two are separated to highlight the importance of strengthening local food production and distribution within individual communities and populated urban regions. Increased small-scale production is most effective when integrated with strong local food systems to distribute food and reach and consumers.

The focus on small-scale agriculture and local food systems is important for discussions on agricultural resilience, as these production styles can increase domestic production, add diversity and flexibility, and can also capitalize on strong and growing social movements already present in British Columbia. Furthermore, this thesis shows that many low-cost and politically feasible policy options can help expand small-scale production. In summary, small-scale agriculture and strong local food systems can play an important role in enhancing the resilience of B.C.'s food system for six main reasons, as outlined below.

Primarily, small-scale agriculture can be developed within the confines of B.C.'s limited agricultural land. Large-scale agriculture has very little room to expand in B.C. Only 5 percent of provincial land is suitable for growing crops. Of this land, only 1

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<sup>10</sup> Agriculture scholar Gail Feenstra describes local food, and the local food movement as a “collaborative effort to build more locally based, self-reliant food economies - one in which sustainable food production, processing, distribution, and consumption is integrated to enhance the economic, environmental and social health of a particular place.” Gail Feenstra, “Creating space for sustainable food systems: lessons from the field,” *Agriculture and Human Values* 19, no. 2 (2002): 100.

<sup>11</sup> There is a wealth of research on GHG reduction techniques for agriculture. The International Panel on Climate Change provides comprehensive research on GHG reduction techniques for agriculture systems in their 4<sup>th</sup> report: International Panel on Climate Change (IPCC). *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment (AR4)*, 2007, Report on the Intergovernmental Panel on Climate Change. Eds: Pachauri, R.K and Reisinger, A. (Geneva, Switzerland: IPCC). [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf)

percent is considered prime farmland, .06% is considered “Class 1” farm land<sup>12</sup>, and only .04% is suitable for tree-fruit production.<sup>13</sup> Furthermore, the majority of prime land is located in three populated urban regions – Vancouver Island, the Fraser Valley and the Okanagan Valley. Food requirements are high in these populated regions, so the expansion of farming on remaining land parcels and development of strong local food economies should be a priority.

Small-scale agriculture is productive. Research by Badgely et al. confirms that “production per unit area is greater on small farms than on large farms in both developed and developing countries; thus, an increase in the number of small farms would also enhance production.”<sup>14</sup> Small-scale agriculture does not require the massive energy-inputs used to fuel modern industrial agriculture and the secondary processing and international transportation sectors. Small-farms, in comparison, often rely on human labour and direct local sales to achieve similar levels of productivity.

Small-scale agriculture enhances diversity.<sup>15</sup> Agricultural diversity can be enhanced in multiple ways, many of which are associated with small-scale production, such as crops on the farm, crop rotation schedules, production techniques, water sources, incomes for farming families, regions producing food (e.g. greater northern B.C. production), urban production, and seasonal production. For example, small-scale agriculture often uses poly-culture production techniques that minimize the impact of crop and income-loss. If a single crop fails on a poly-culture farm, other crops will

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<sup>12</sup> The Agricultural Land Reserve is divided into seven distinct land classifications, based on the quality of soil and climate conditions. Class 1 land is defined as land that is “capable of producing the very widest range of crops. Soil and climate conditions are optimum, resulting in easy management.” British Columbia, Agricultural Land Commission. “Agriculture Capability,” (Victoria, B.C.), 2013. [http://www.alc.gov.bc.ca/alr/Ag\\_Capability.htm](http://www.alc.gov.bc.ca/alr/Ag_Capability.htm) (Accessed March 2nd, 2013).

<sup>13</sup> Smith, Barry E. “A Work In Progress: The British Columbia Farmland Preservation Program.” Paper prepared for *Smart Growth B.C.*, Victoria, British Columbia, 2007. [http://www.smartgrowth.bc.ca/Portals/0/Downloads/AWorkinProgress\\_Smith.pdf](http://www.smartgrowth.bc.ca/Portals/0/Downloads/AWorkinProgress_Smith.pdf)

<sup>14</sup> Catherine Badgley et al., “Organic agriculture and the global food supply,” *Agriculture and Food Systems* 22, no. 2 (2007): 82.

<sup>15</sup> This is confirmed both in academic research, and was confirmed in my interviews with small-scale farmers (described on the following page), which confirmed that diversification strategies are essential to the success of many small-scale farms. Berardi et al. state that “the innovative nature of small farms can be seen in their disproportionately high enrolment in conservation programs and in crop diversification strategies. Gigi Berardi et al., “Stability, Sustainability and catastrophe: Applying resilience thinking to U.S. Agriculture,” *Research in Human Ecology Review* 18, no. 2, (2011): 121.

continue to produce. With large-scale mono-crop production, the threat of losing an entire harvest or an entire region's harvest is far greater.

Small-scale agriculture is flexible. Berardi et al. confirm “smaller producers are at times better suited to respond quickly to market needs, thus adapting supply to demand.”<sup>16</sup> Unlike large-scale growers, who often invested heavily in the equipment and infrastructure required to produce one or two staple crops, small-scale growers can quickly adapt to new circumstances, such changing consumer demands for new crops. The direct connection between producer and consumers in local-food systems allows growers to quickly respond to consumer preferences, and consumers to shift their consumption towards products that are locally available

Small-scale farming and local food systems are associated with positive environmental benefits. Weis suggests that small-scale agriculture is associated with “conserving and building soil fertility (e.g. contouring, digging in agricultural wastes; using (predominantly) biological controls for insects, weeds, fungi and diseases; employing intercrops; managing multiple, smaller harvest periods; selecting and savings seeds; conducting (and sharing) localized ecological research; using animal traction; and integrating small-scale grazing and pasturing.”<sup>17</sup> Not all small farms practice these techniques, but many of these healthy practices are easier to carry out on smaller plots of land.

Lastly, there is already a growing local food movement in British Columbia that is supportive of small-scale production.<sup>18</sup> This movement, made up of environmental conscious consumers, enthusiastic small-scale farmers, popular farm markets, progressive municipalities, and advocacy groups such as FarmFolk/CityFolk, can provide guidance and help support the continued growth in this sector. As local food systems expand, more consumers and farmers are drawn into this economy, creating further growth. In addition to grassroots growth, there are a vast range of low-cost and politically feasible policy

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<sup>16</sup> Gigi Berardi et al., “Stability, Sustainability and catastrophe,” 121.

<sup>17</sup> Weis, “The Accelerating Biophysical Contradictions of Industrial Capitalist Agriculture,” 334.

<sup>18</sup> Brian Morton, “Farmers markets flourishing across B.C. as more buyer's go local.” *The Vancouver Sun*, July 2, 2013, <http://www.vancouversun.com/Farmers+markets+flourishing+across+more+buyers+local/8603059/story.html>

options that provincial and municipal governments can use to facilitate growth in this sector.

*Research Methodology: Interviews with Small-Scale Farmers*

The agriculture policies explored in this thesis are informed primarily by sixteen in-depth interviews with small-scale farmers in British Columbia's three main agricultural and urban regions: the Okanagan Valley, the Lower Mainland and Vancouver Island. Ethics clearance for this process was obtained through Human Research Ethics Board at the University of Victoria and farmers provided signed consent to use their ideas and quotations in the thesis. These interviews were to gather local perspectives on the types of policies required to expand small-scale production and strengthen local food systems in B.C. In particular, this research documents the key challenges to small-scale production in B.C., including land-access and market access issues, and to hear about success stories that could be shared with other farms or policy makers. Local perspectives are important in agriculture, as farm policies should be tailored to regional issues such as land prices and availability, weather and soil conditions, water availability, pest or deer problems, and economic/social conditions.

The research design for this thesis uses a needs assessment approach that is informed by purposive sampling methods. The needs assessment research design focuses on a small community of informed participants (farmers) who are aware of current practices (e.g farm policy), and have insights on how policies should change to help expand local production. To find interview participants, this research relied on purposive sampling and quantitative methods to seek out participants who are particularly knowledgeable about a particular subject matter. Participants were contacted through local farm markets in each region, and through the Young Agrarians Organization and the Certified Organic Association of British Columbia website. Early participants recommended four later participants as experts on small-scale agriculture. Interviews were conducted with a diverse mix of new and experienced farmers, conventional and organic growers, farms that produced a different range of goods (e.g. single-crop farms and poly-culture farms), and farms that sold their products through different supply chains. Most interviews were completed on farm property, in order to meet the farmers

on their land, and to better understand the unique challenges and successes of each farmer.

The interviews were semi-structured and followed a set of general questions that initiated broader discussion. The interview questions used are found in Appendix A. Each interview began with a series of questions to draw out the opportunities and challenges associated with starting farming, including questions on how each farmer obtained land and started farming, how their skills were acquired, and what barriers they faced when they began. Subsequent questions focused on the current challenges the farmers faced, and what solutions they could see to help overcome these challenges. In particular, participants were asked how provincial and local government policies had helped or hindered their farm, and what new policies or programs could provide the most benefit. The questions were designed to capture the policy needs required by a small sample of small-scale farmers in B.C.

Most of the interviews lasted between one and three hours. All of the participants were happy to discuss agriculture and generally felt that shared knowledge could benefit the industry and improve food security. Each interview was recorded on an audio device and later transcribed on a computer; transcribing the interviews made it easier to scan each discussion and look for common themes. The participant names will remain anonymous to allow me to convey their ideas accurately. The interviews confirmed the untapped potential of small-scale agriculture in B.C, but also highlighted the serious challenges, such as high land costs, lack of land-lease opportunities, weak local food systems in certain regions, and insufficient financial and technical support, faced by many small-scale growers. Throughout the thesis, the information and observations gathered from the interview process will be used to provide unique insights into B.C agriculture policy.

The following Table (Table 1) provides a list of all of the participants interviewed, and includes information on their farm location and size, their farming experience, and whether they own or lease land. The Table also includes a section for personal and business information on each farm that helps provide more insight into the diversity of each operation.

**Table 1: Characteristics of Participants**

<b>Participant</b>	<b>Location</b>	<b>Land Size (acres)</b>	<b>Land Access (own, lease, family land)</b>	<b>Years Farming</b>
<i>Farmer #1</i>	<i>Okanagan</i>	<i>8 acres</i>	<i>Owner</i>	<i>20</i>
<p>-Produced multiple varieties of apples using conventional techniques.            -Sold crops through local a co-operative packing house to major distributors.            -Was concerned about impact of climate change on production; focused on reducing on-farm emissions and pesticide usage through various techniques including use of high-efficiency tractor, composting, and ecological pest management            -Obtained a degree in agriculture from McGill University. Operated two other farms before settling on current piece of land.</p>				
<i>Farmer #2</i>	<i>Okanagan</i>	<i>2.2 acres</i>	<i>Family Owned Land</i>	<i>15 (approx.)</i>
<p>-Young family with three children.            -Polyculture vegetable farm using non-certified organic techniques.            -Not certified organic due to costs and paperwork associated with certification.            -Raised goats for milk and meat.            -Sold goods to friends and local farmers market; produced for family consumption.            -Began farming career operating a family-owned 10-acre cherry orchard, but left due to health problems caused by pesticide use.</p>				
<i>Farmer #3</i>	<i>Okanagan</i>	<i>10 acres</i>	<i>Family Land</i>	<i>10</i>
<p>-Two brothers operating land that was previously farmed by retired parents.            -Land located within municipal boundaries.            -Land had been in family for more than forty years, but pressure to sell to developers was high due to location.            -Certified organic polyculture farm including fruit trees and animals.-Sold goods at multiple farm markets throughout the Okanagan Valley.            -Began farming by operating 55+ acres of conventional apples, but were forced to reduce their operation due to drastic price swings in international apple markets.</p>				
<i>Farmer #4</i>	<i>Okanagan</i>	<i>10 acres</i>	<i>Family Land</i>	<i>5</i>
<p>-Produced multiple varieties of apples using conventional techniques.            -Sold crops through a family owned packing house to major distributors.-Obtained a business degree from the University of British Columbia before taking over family farm land.            -Would not have started farming, and could not continue to afford to farm, without family land.            -Actively involved in marketing B.C. apple products through various industry associations.</p>				
<i>Farmer #5</i>	<i>Okanagan</i>	<i>7.5 acres</i>	<i>Owner</i>	<i>1</i>
<p>-Young couple with a new baby.            -Polyculture vegetable farm using non-certified organic techniques. Not certified organic due to costs and paperwork associated with certification.            -Raised chickens and pigs primarily for own consumption.</p>				

<p>-Had recently purchased farmland and were struggling with high payments for their land.          -Sold goods at multiple farm markets throughout the Okanagan Valley. Were not happy with local farm market, and were exploring options to drive food to Vancouver to sell at busier urban markets.          -Started farming at community gardens in Vancouver before deciding to move to the Okanagan to expand farm scale.</p>				
<b>Farmer #6</b>	<b>Lower Mainland</b>	<b>1 acre</b>	<b>Lease Land</b>	<b>1</b>
<p>-Polyculture vegetable farm using non-certified organic techniques. Not certified organic due to costs and paperwork associated with certification.          -Completed an agriculture program at Kwantlen Polytechnic University.          - Partnered with two other students from program and leased land that used to be a commercial nursery. Land already had drip irrigation and greenhouses.          -Started farm as a "U-pick," then expanded into farm markets and direct sales to local restaurants. Wanted to find more permanent land to lease (e.g. 4-5 year lease contract).</p>				
<b>Farmer #7</b>	<b>Lower Mainland</b>	<b>1 acre</b>	<b>Family Land</b>	<b>5</b>
<p>-Eight acre property with one acre of actively farmed land.          -Land had been in family for more than sixty years, but pressure to sell to developers was high due to location.          -Polyculture vegetable farm using non-certified organic techniques. Not certified organic due to costs and paperwork associated with certification.          -Young couple in their late 20s. Started farming at the UBC farm. Completed a practicum in sustainable agriculture at the University of British Columbia.          -Sold goods through a Community Supported Agriculture (CSA) program, local farm markets, and a roadside farm stand.          -Had a farm mentor through a mentorship program offered by the Young Agrarian organization.</p>				
<b>Farmer #8</b>	<b>Vancouver</b>	<b>4 acres</b>	<b>Lease Land</b>	<b>4</b>
<p>-Polyculture vegetable farm using non-certified organic techniques.          -Farmed in moveable containers on four small plots leased from local governments or property developers.          -Non-profit business dedicated to hiring low-income residents and homeless individuals.          -Received grant money from the Vancouver City Credit Union to help cover costs.          -Sold goods at local farm markets and sold directly to restaurants.</p>				
<b>Farmer #9</b>	<b>Vancouver Island</b>	<b>8 acres</b>	<b>Owner</b>	<b>10</b>
<p>-Certified organic polyculture farm, with a focus on organic blueberry production for fruit and berry wines.          -Sold produce at local farm markets and directly to restaurants.          -Working with other local farmers to build a large centralized farm market location on land owned by Ducks Unlimited.          -Taught farming courses at a local community college.</p>				
<b>Farmer #10</b>	<b>Vancouver Island</b>	<b>4 acres</b>	<b>Owner</b>	<b>20</b>
<p>-Certified organic polyculture farm.</p>				

<p>-Sold products at local farm markets.</p> <p>-Began farming through a labour-transition program for people leaving the commercial fishing industry. Used government infrastructure grant programs to help build a deer fence and dig a water well.</p> <p>-Land was not in the Agricultural Land Reserve (ALR), even though it was hospitable to agriculture.</p> <p>-Had three labours from the World Wide Opportunities on Organic Farms (WWOOF) program at all times. Had 600 WWOOF participants in 10 years.</p> <p>-Taught farming at local elementary school.</p>				
<b>Farmer #11</b>	<b>Vancouver Island</b>	<b>2 acres</b>	<b>Owner</b>	<b>40</b>
<p>-Twenty acre property with two acres of actively farmed land.</p> <p>-Polyculture vegetable farm using non-certified organic techniques. Small cattle herd.</p> <p>-Previously operated much larger cattle operation, but regulatory changes for meat processors, whereby farmer could not butcher his own animals, led to increased costs and farmer was forced to shrink operation.</p> <p>-Sold vegetables at local farm markets and roadside market.</p>				
<b>Farmer #12</b>	<b>Vancouver Island</b>	<b>4 acres</b>	<b>Owner</b>	<b>15</b>
<p>-Certified organic, single crop farm.</p> <p>-Intensive indoor production.</p> <p>-Sold products throughout Western Canada through major food distributors.</p> <p>-Over 30 staff and six managers.</p>				
<b>Farmer #13</b>	<b>Vancouver Island</b>	<b>4 acres</b>	<b>Owner</b>	<b>20</b>
<p>-Certified organic polyculture farm.</p> <p>-Sold high end crops exclusively to local restaurants.</p> <p>-Four staff members in spring/summer months.</p> <p>-Mentored other young farmers in the region.</p> <p>-President of the Small Scale Food Processors Associations.</p>				
<b>Farmer #14</b>	<b>Vancouver Island</b>	<b>1 acre</b>	<b>Lease Land</b>	<b>1</b>
<p>-Young couple in their early 30s.</p> <p>Polyculture vegetable farm using non-certified organic techniques. Not certified organic due to costs and paperwork associated with certification, and time requirements to become certified (4 years).</p> <p>-Raised chickens for eggs.</p> <p>-Sold goods at local farm markets, and through door-to-door sales.</p> <p>-Both farmers (husband and wife) had other jobs to help supplement farm income. -Wanted to expand production, but could not find larger piece of farmland that had the infrastructure they required available for lease.</p>				
<b>Farmer #15</b>	<b>Vancouver Island</b>	<b>1 acre</b>	<b>Lease Land</b>	<b>11</b>
<p>-Certified organic polyculture farm.</p> <p>-Operated a lease plot at a municipally-owned community farm.</p> <p>-Benefited greatly from infrastructure (fencing, indoor wash area) and services (sales coordinator) offered by community farm.</p> <p>-Sold products primarily at local farm markets, and at an on-farm food stand.</p>				

-Learned basic farming techniques from a short course at local community college.				
<i>Farmer #16</i>	<i>Okanagan</i>	<i>1 acre</i>	<i>Lease Land</i>	<i>8</i>
<ul style="list-style-type: none"> <li>-Certified organic polyculture farm.</li> <li>-Operated a lease plot at a municipally-owned community farm.</li> <li>-Started farming as an apprentice at another local farm. After four years as an apprentice, started a new farm on private land provided for no cost by a local retiree.</li> <li>-Obtained a farm plot at municipally-owned community farm through contacts made at local farm markets.</li> <li>-Sold products primarily at local farm markets and at on-farm food stand.</li> </ul>				

### *Thesis Limitations and Delimitations*

Although the research approach (described above) is valuable to obtain in-depth perspectives on policy reform options, a qualitative approach of a small sample of farmers may not accurately represent the perspectives of the broader small-scale farm community. Therefore, future research could explore similar issues at a more general level, but utilize a quantitative approach focused on a much larger group of participants. This may highlight other trends that were not caught in the interview for this thesis. This research could be used to complement the quantitative approach in this thesis.

Additionally, the policy appendix that concludes the thesis does not discuss the direct impact that each policy may have on building resilience. This information was not included for several reasons. Primarily, the focus of this thesis is on the policies that B.C. farmers believe are beneficial for small-scale agriculture and local-food systems, and areas where farmers feel they need further assistance. In absence of comprehensive research on the outcome that each policy may have on food production, they likely reflect policy needs accurately. Furthermore, the thesis only includes policy issues that were discussed by multiple farmers, to increase the likelihood that a specific policy would be beneficial to a wider community.

In some cases, research on the impact of individual agriculture policies is simply unavailable. This is complicated by the multiple criteria that can be used to study a policy's impact. For example, while an individual policy may not have a drastic impact on local food production, it may help shift public opinion to prepare for more wide-scale future reform. These impacts are very difficult to calculate. For example, prior to the implementation of the Agricultural Land Commission in 1973, various regional land planning commissions helped to coordinate land-use decisions on urban expansion and

agriculture land use.<sup>19</sup> These agreements may have helped the public accept the strict land-use requirements of the Agricultural Land Reserve.

### *Organization of Thesis*

The second chapter of this thesis will review current climate science, and discuss the problems climate change will create for food systems. The third chapter will present a current state analysis of B.C. agriculture to highlight the key reasons why B.C.'s food system is currently unprepared to deal with expected climate threats. These background chapters will set up a discussion on how B.C. can address the impending challenges related to climate change. Chapter four argues that an effective way to prepare for climate change is to enhance the resilience of B.C.'s food system. This chapter presents an analysis of resilience literature and suggests that a resilient food system builds on three important attributes: internal strength, diversity and flexibility. The final two chapters will explore the policies that can help create greater agricultural resilience, and the obstacles and opportunities that governments will face when implementing these policies. Chapter five presents all of the information gathered from the interviews with small-scale farmers across B.C. Chapter six then explores the myriad political, economic and social forces that can reasonably be expected to impact policy reform. These final chapters conclude with chapter seven, where each policy option is weighed against the expected challenges and opportunities associated with implementation.

The ultimate intent of this thesis is to present a comprehensive analysis of realistic policy options to expand small-scale production, foster strong local-food systems in key urban regions, and enhance agriculture resilience in British Columbia. This policy research, informed partially by B.C. farmers who may not have previously had their ideas put on paper, can help inform the broader discussion on agriculture reform, GHG emission reductions, and preparation for climate change in British Columbia.

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<sup>19</sup> Christopher Garrish, "Unscrambling the Omelette: Understanding British Columbia's Agricultural Land Reserve." *BC Studies*, no. 136 (2002), 22-55.

## Chapter 2 – Background: Climate Change and Food Systems

The international scientific community overwhelmingly agrees that climate change will create major problems for ecological and social systems around the world.<sup>20</sup> Agricultural problems commonly anticipated with global warming include changes in weather patterns, including both flooding and drought, desertification, soil erosion, air pollution, pest/pathogen invasions, disrupted pollination and growth cycles, ocean acidification, rising ocean levels, and glacier loss.<sup>21</sup> These changes may affect food systems in endlessly diverse ways. Furthermore, efforts to combat rising GHG emissions will conflict with industrial agriculture's reliance on high-emission and energy-dependent methods of production, including production of key staple crops such as corn, wheat, canola and soy. Regardless of future actions, human activity to date has already ensured that the atmosphere will continue warming for at least 400 more years.<sup>22</sup> Long-term projections confirm that 21<sup>st</sup> century emissions may continue to affect the atmosphere in the year 3000.<sup>23</sup> The delay between current emissions and future problems makes climate predictions more difficult; many more unanticipated problems associated with current emissions are likely to appear.

The danger of climate change is heightened by the inability to predict the precise timing and severity of climate threats. For example, while we know droughts will become more common, we cannot pinpoint the years they will occur, or their duration. It is also

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<sup>20</sup> Much of this research has been reviewed and compiled by the United Nation's official body responsible for monitoring climate change called the International Panel on Climate Change (IPCC). To date, the IPCC has released four comprehensive reports on the causes and effects of global warming. The most recent report was produced in 2013. Information on the history of the global climate, the causes of modern warming, and the effects of warming can be found in the IPCC's fourth report: International Panel on Climate Change (IPCC). *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment (AR4)*, 2007, Report on the Intergovernmental Panel on Climate Change. Eds: Pachauri, R.K and Reisinger, A. (Geneva, Switzerland: IPCC). [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf)

<sup>21</sup> While this information is documented in numerous research articles, a valuable summary of this literature can be found in the following publication: National Research Council, Committee on Ecological Impacts of Climate Change. *Ecological Impacts of Climate Change*. Washington, DC: The National Academies Press, 2008, 38-40.

<sup>22</sup> Bill Hare and Malte Meinshausen, "How much warming are we committed to and how much can be avoided," *Climate Change* 71, no. 1 (2006): 122.

<sup>23</sup> G.K. Plattner et al., "Long term climate commitments projected with climate carbon cycle models," *Journal of Climate* 21, no. 12 (2008): 2721.

difficult to anticipate how or when the global community will make firm commitments to reduce GHG emissions. Depending on human actions, climate threats could range from mild to catastrophic. Many factors (e.g. economic growth, population migration or human health) will determine whether and how fast they decide to react, and the tools they will have at their disposal. Recent inaction by heavy polluters such as the China, the United States, and Canada (the later on a per capita basis) offers little hope that GHG emissions will be reduced in the near future: this suggests that food systems actors should prepare for the effects of a warming world.

### **Water Issues: Precipitation and Flooding**

Stable water sources and precipitation patterns are integral elements of a strong agriculture system. Climate change will severely disrupt precipitation cycles, which will lead to flooding and drought, and subsequent crop failures and food shortages. Excess precipitation, flooding, and soil waterlogging<sup>24</sup> are particularly problematic for farmers, as very little can be done to mitigate these problems, other than waiting for better weather, which may take years. In some cases, minor flood conditions can be mitigated with secondary systems (e.g. dykes, cover crops, advanced tillage systems), but these options can be costly and time consuming, or require specialized knowledge that may not be readily available to most farms. Major flooding is very difficult to overcome. Climate scientist Andrew Weaver succinctly summarizes the scope of this instability:

In Canada, overall precipitation will increase, but it will come in fewer, more extreme events, interspersed between longer periods of little or no precipitation. There will be increased risk of flooding. The precipitation will be skewed to the winter, with a greater likelihood of rain instead of snow as the century progresses. And summer drought will become more common. These changes pose significant challenges for communities as they attempt to meet future water demands.<sup>25</sup>

Durack, Wijffels, and Matear, a team of oceanographers studying precipitation patterns, suggest that wet regions will generally become wetter, while dry regions will become

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<sup>24</sup> Waterlogging occurs whenever the soil is so wet that there is insufficient oxygen in the pore space for plant roots to be able to adequately respire. Soil Quality, “Water Logging Facts,” <http://soilquality.org.au/factsheets/waterlogging> (Accessed January 14th, 2014).

<sup>25</sup> Andrew Weaver, *Keeping Our Cool*, (Toronto: Penguin, 2009), 217.

drier in response to warming.<sup>26</sup> A warming climate will also increase evaporation levels in oceans and lakes, creating “a positive feedback that may contribute to yet more warming and an intensification of the hydrological cycle.”<sup>27</sup> As the stability of water sources erodes, the agriculture systems that rely on them will also suffer. For example, a ground-crop farm that loses its annual production to flooding or drought may not be able to financially afford to wait for the next growing seasons, possibly causing the farmer to sell or abandon their land. The extreme 2013 summer floods in Southern Alberta show the devastation that excess precipitation can have on entire communities or regions.<sup>28</sup>

The important agricultural regions of southwestern B.C. and Vancouver Island, where overall precipitation is heavier, could face an even greater chance of water logging or flooding in years of high precipitation. Small increases in precipitation can quickly push the soil in these wet regions past their natural saturation limits. Excess rain and hail can also wipe out crops by bruising or puncturing the skin of soft fruits; cherry, apple and peach crops in the Okanagan are regularly ruined by such weather conditions. For example, hail storms in May 2014 devastated many of the crops in the South Okanagan, where one farmer estimate he lost “100 percent of his apple crop, 70 to 80 percent of his cherries, and 70 to 80 percent of his peaches, in the storm that lasted around 15 minutes.”<sup>29</sup>

Excessive rain is a threat to low-lying agricultural regions where farmland is susceptible to river flooding. Many of B.C.’s prime agricultural regions border major rivers, such as the Okanagan River, the Peace River, and the Cowichan River on Vancouver Island. Excess precipitation will also put pressure on British Columbia’s largest river, the Fraser. If the Fraser floods, it has the potential to ruin large tracts of farmland in the province’s most productive agricultural region. The Fraser has had two

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<sup>26</sup> Paul J. Durack, Susan E. Wijffels, Richard J. Matear, “Ocean Salinities Reveal Strong Global Water Cycle Intensification During 1950 to 2000,” *Science* 336 No. 6080 (2012): 455.

<sup>27</sup> Cynthia Rosenzweig and Daniel Hillel, *Climate Change and the Global Harvest: Potential Impacts of the Greenhouse Effect on Agriculture*, (New York: Oxford University Press, 1998), 37.

<sup>28</sup> The Canadian Press, “Alberta Floods Have Changed the Rockies Forever, Says Scientist,” *The Huffington Post*, June 24, 2013, [http://www.huffingtonpost.ca/2013/06/24/alberta-floods-rockies-damage\\_n\\_3492115.html](http://www.huffingtonpost.ca/2013/06/24/alberta-floods-rockies-damage_n_3492115.html)

<sup>29</sup> Deborah Pfeiffer, “Hailstorm Damages Fruit,” *Castanet News*, May 27<sup>th</sup>, 2014, <http://www.castanet.net/news/Penticton/116023/Hailstorm-damages-fruit>

recent major floods, one in 1894 and another in 1948, and scientists predict another massive flood in the next 50 years.<sup>30</sup> Multiple floods in the same year, either in B.C. or regions that supply B.C., could quickly push the food economy into crisis.

### **Water Shortages, Drought and Desertification**

Climate change will also increase the likelihood of drought conditions in B.C. and around the world.<sup>31</sup> The Interior and Northern B.C., the Okanagan Valley, and parts of Southern Vancouver Island and Sunshine Coast are particularly dry areas that are vulnerable to drought conditions. In the Okanagan, agriculture already accounts for 75% of water use.<sup>32</sup> This region is the largest true desert in Canada,<sup>33</sup> meaning low water levels in lakes and rivers will have major implications for the fruit industry in the area. Okanagan farmers are also burdened by American neighbours who expect a sustainable amount of water to flow through the Okanagan River to the massive fruit industry in Washington State.<sup>34</sup> International water sharing agreements with the United States, such as the Columbia River Treaty, will likely create more complications during drought years in British Columbia.

Drought conditions will negatively affect the large prairie regions British Columbia relies on for wheat, corn, soy, and canola.<sup>35</sup> Both the Canadian prairies and the American Mid-West are particularly vulnerable to drought due to the limited base-level water resources in these regions. A study on global warming's impact on the Canadian prairies states that this productive region will likely face droughts longer and more often

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<sup>30</sup> Fraser Basin Council, *Flood Hazard Management on the Fraser River*, 2011. <http://www.fraserbasin.bc.ca/programs/flood.html> (Accessed, November 3, 2011)

<sup>31</sup> IPCC, *AR4*, Working Group II: Impacts, Adaptation and Vulnerability, 3.4.3 *Floods and droughts*.

<sup>32</sup> Denise Neilsen et al., "Agricultural Water Supply in the Okanagan Basin: Using Climate Change Scenarios to Inform Dialogue and Planning Processes," in *Farming in a Changing Climate: Agricultural Adaptation in Canada*, ed. Ellen Wall et al. (Vancouver: UBC Press, 2007), 84.

<sup>33</sup> For information on the Okanagan Desert, see The Osoyoos Desert Society, <http://www.desert.org/> (Accessed October 20, 2014).

<sup>34</sup> The International Joint Commission under the Boundary Waters Treaty was signed to ensure adequate water flow from British Columbia to Washington State in the Okanagan River. Okanagan Basin Water Board, "Projects," <http://www.obwb.ca/projects/> (Accessed October 20, 2014).

<sup>35</sup> British Columbia only produces 14% of its grain requirements (this includes production for the export market). The majority of grain imports come from the United States and Canadian Prairies. British Columbia. Ministry of Agriculture. *B.C.'s Food Self Reliance: Can B.C.'s Farmers Feed Our Growing Population*. Victoria, B.C.: Government of British Columbia, 2007, 1. [http://www.agf.gov.bc.ca/resmgmt/Food\\_Self\\_Reliance/BCFoodSelfReliance\\_Report.pdf](http://www.agf.gov.bc.ca/resmgmt/Food_Self_Reliance/BCFoodSelfReliance_Report.pdf)

than those experienced in the 1930s.<sup>36</sup> A similar study on the American Great Plains highlights how this region will likely face drought and dust bowl conditions more severe than those in the 1930s.<sup>37</sup> Severe droughts in Northern BC in 2014 wiped out the canola harvest and the recent 2013-2015 severe droughts in California increased crop prices by 10% and forced some regions to transport spawning salmon upriver by tanker trucks.<sup>38</sup>

### **Glaciers and Snowpack**

Climate change accelerates the loss of glaciers and snowpack. This will create long-term impact on the rivers and lakes that agricultural systems rely on.<sup>39</sup> All of B.C.'s major rivers are supplied by glacier and snow-pack run-off; over time, accelerated melting will reduce the size of the annual run-offs that supply B.C.'s farms. Two key consequences follow from these changes: in the short term, the risk of flooding may increase as accelerated melting adds pressure on water systems, potentially increasing the threat of flooding. In the long term, loss of glacier and snow-pack will reduce the stable volume of spring runoffs that farmers have relied on for centuries. Studies suggest that water levels have already begun a long-term decline on the Prairies:

As the glacial cover has decreased, so have the downstream flow volumes. Warmer temperatures should cause increased glacier runoff in the short term. Historical stream flow data indicated that this increase flow phase has already passed, and that the river basins of the western Prairies have entered a potentially long-term trend of declining summer flows.<sup>40</sup>

Pederson et al.'s research into the American prairie regions shows that this massive agricultural region will be severely affected by reduced water flow in the future.<sup>41</sup> In a recent interview, Pederson noted that 60 to 80 percent of Alberta's water would be threatened by shrinking glaciers and snowpack.<sup>42</sup> The ripple effects of a decline in stable

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<sup>36</sup> Neilson, "Agriculture Water Supply in the Okanagan Basin," 80.

<sup>37</sup> Rosenzweig and Hillel, *Climate Change and the Global Harvest*, 29.

<sup>38</sup> Andria Cheng, "California farm drought crisis deepens," *The Wall Street Journal*, February 22, 2014. <http://www.marketwatch.com/story/california-farm-drought-crisis-deepens-2014-02-22-16103424>

<sup>39</sup> Anthony Arendt, John Walsh, and William Harrison, "Changes in Glaciers and Climate in North-western North American during the Late Twentieth Century," *Journal of Climate* 22, no. 15 (2009): 4117.

<sup>40</sup> Neilson, "Agriculture Water Supply in the Okanagan Basin," 7.

<sup>41</sup> Pederson et al., "The Unusual Nature of Recent Snowpack Declines in the North American Cordillera," *Science* 333, no.6040 (2011): 332.

<sup>42</sup> Margaret Munro, "Shrinking snowpack in Rocky Mountains threaten water supplies: study," *The Vancouver Sun*, June 9, 2011.

crops from these regions could easily be felt worldwide. As a large portion of B.C.'s wheat, corn, soy and canola comes from these prairie regions, the province should ensure it can offset steep import declines with alternative production. If warming continues for hundreds of years, glaciers could disappear completely, creating a catastrophe for agriculture.

The impact of warming on glaciers and snowpack will hit the region British Columbia relies on most for agricultural imports: California. The productive regions of California rely on the Sierra Mountains and the Colorado for most of their fresh water. Ostry et al. note that “by the end of the century, the Sierra Nevada [snow pack] is predicted to be 30% to 70% lower than at present, due to an increase in rainfall versus snowfall, and an earlier melting of the snowpack.”<sup>43</sup> The Colorado River, which supplies water to much of southern California and Northern Mexico, has also been drying up. The Colorado now runs dry before it reaches the Gulf of California. Water shortages in California and Mexico will be a major problem for British Columbia in the winter months, when B.C. traditionally imports most of its fresh fruit and vegetables from these regions. The long-term consequences of reduced California productions would be devastating for food security in B.C.

### **Rising Ocean Levels**

Climate change will cause ocean levels to rise, creating new flood-related threats for low-lying agricultural regions across the world, including British Columbia. Current research on sea-level projections in British Columbia's Fraser Delta region predicts a 50cm increase by 2100, with 30cm-70cm of variance.<sup>44</sup> This research notes that “More extreme estimates [are] based on the not unrealistic possibility that rapid ice sheet melting will cause global mean sea level rise of 90cm to 100cm for Vancouver, Victoria and Prince Rupert, 120cm for the Fraser River delta, and 70 to 80cm for the west coast of

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<http://www.vancouver.sun.com/technology/Shrinking+snowpack+Rocky+Mountains+threatens+water+supplies+study/4921612/story.html>

<sup>43</sup> Ostry et al., *Climate Change and Food Security*, 15.

<sup>44</sup> Richard E. Thomson, Brian D. Bornhold, and Stephane Mazzotti, *An Examination of the Factors Affecting Relative and Absolute Sea Level in Coastal British Columbia*, (Sidney, British Columbia): Fisheries and Oceans Canada, Institute of Ocean Sciences, 2008, 5.

Vancouver Island.”<sup>45</sup> While these predictions are consistent with those from the IPCC, some see these figures as too conservative, as they do not contain melting data from the Antarctic and Greenland ice-sheet break-up. Taking these massive ice sheets into account, extreme estimates suggest that sea levels could easily rise by 7-10 meters over the long-term.<sup>46</sup> Even with a 50 to 100cm rise, many low-lying agricultural regions near Richmond, Ladner, and parts of Surrey will be vulnerable to flooding.

In other parts of the world, rising sea levels will damage vital coastal agricultural regions. For example, many of the rice growing areas in Asia are located at or near sea level. According to Brown, “Every rice growing river delta in Asia is threatened by the melting of these [Greenland and West Antarctic] ice sheets. Even a 3-foot rise would devastate the rice harvest in the Mekong Delta, which produces more than half the rice in Vietnam, the world’s number two rice exporter... A 3 foot rise in sea level would inundate half the rice land in Bangladesh, home to 160 million people.”<sup>47</sup> Rice is a staple food for many citizens; reduced global production will shock supply networks, limit the availability of imports to B.C. and increase overall prices. Climate change also contributes to ocean acidification, which may “lead to a large scale redistribution to global fish catch potential.”<sup>48</sup> B.C. should monitor the impact of acidification on the fishing industry, especially the important wild and farmed salmon industries.

### **Pests, Pathogens, and Weeds**

A warming climate will cause invasive weeds, pests, pathogens and fungal blights to migrate north into previously cooler regions. The mountain pine beetle is a powerful example of an insect that should be regulated by periods of cold winters, but caused extreme financial and ecological damage due to rising temperatures.<sup>49</sup> In a paper prepared

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<sup>45</sup> Ibid, 5.

<sup>46</sup> Ted Scambos, “Earth’s ice: sea level, climate, and our future commitment,” *Bulletin of the Atomic Scientists* 67, no. 1 (2011): 30.

<sup>47</sup> Lester R. Brown, *Plan B. 4.0 Mobilizing to Save Civilization*, (New York: W. W. Norton & Company, 2009), 55.

<sup>48</sup> Simon Gosling et al., “A review of recent developments in climate change science. Part II: The global scale impacts of climate change,” *Progress in Physical Geography* 35, no. 4 (2011): 447.

<sup>49</sup> Will Koop, “Pine beetle blight may bring Fraser-flooding,” *The Georgia Straight*, February 28, 2007. <http://www.straight.com/article-73041/pine-beetle-blight-may-bring-fraser-flooding>

for the U.S. Department of Agriculture, University of Berkeley scientists outlined how warming will change pest migration and breeding patterns:

Most research indicates that insect pest activity, the second major cause of damage to crops, will increase under climate change, leading to a greater risk of crop losses. Moreover, while the direct effects of climate change on crops are expected to occur gradually, allowing controlled adaptation, changes in pest activity may occur quickly and dramatically. New pest invasions can cause significant damage within a very short period and may remain indefinitely<sup>50</sup>

Pest invasion is particularly worrisome for B.C., as the productive agriculture regions in California and Mexico could act as host regions and help pest species migrate into the province. These changes have already begun in British Columbia: the Spotted Wing *Drosophila* (fruit fly) has migrated to B.C. from warmer climates in California and Hawaii.<sup>51</sup> This devastating invasive pest can survive on a wide variety of crops, including cherries, peaches, plums, nectarines, strawberries, blueberries, blackberries and grapes. Furthermore, research shows that warmer temperatures will increase the likelihood that invasive plants (weeds) will also migrate to warmer climates.<sup>52</sup>

### **Frost and Pollination Problems**

Although climate change will lead to long-term warming, it will also create more drastic fluctuations in yearly weather.<sup>53</sup> This can lead to late spring frosts that kill blossoms, cool spring/summer temperatures that can reduce yields, or early fall frost that can kill a plant or stop it from producing. In years when unpredictable cold spells do not happen, higher-than-normal summer temperatures can harm crops by burning the skin on

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<sup>50</sup> Holly Ameden and David Just, "Pests and Agriculture Production under Climate Change," Paper prepared for the *American Agriculture Economics Association*, Chicago, 2011.  
<http://ageconsearch.umn.edu/bitstream/20722/1/sp01am02.pdf>

<sup>51</sup> British Columbia, Ministry of Agriculture. *Spotted Wing Drosophila: A new vinegar fly pest in British Columbia*. Victoria, B.C.: Government of British Columbia, 2011.  
[www.agf.gov.bc.ca/cropprot/swd\\_brochure.pdf](http://www.agf.gov.bc.ca/cropprot/swd_brochure.pdf)

<sup>52</sup> Kimberly Tungate et al., "Potential Changes in Weed Competitiveness in an agroecological system with elevated temperatures," *Environmental and Experimental Botany* 60, no. 1 (2007): 43.

<sup>53</sup> International Panel on Climate Change, "Current sensitivities: climate variability and extremes," *IPCC Fourth Assessment Report: Climate Change 2007*,

vegetables and fruits.<sup>54</sup> Many plants also require a certain number of “chilling hours” at night, which may fall by 80% by 2100.<sup>55</sup>

Corn, a staple of the Western diet, is very susceptible to temperature changes. Corn plants rely on stable temperature, humidity, and wind to transfer pollen from the tassel (male) to the ear (female). Poor conditions, especially extreme heat, can drastically reduce corn yields.<sup>56</sup> In the Okanagan’s fruit tree industry, blossoms exposed to early frosts can devastate crops.<sup>57</sup> Climate change may also impact the pollination cycle of bees, with serious potential consequences for all production.<sup>58</sup>

### **The Unpredictability of Climate Change**

While warming is inevitable, the path that societies decide to take in the next 100 years will have major implications for the level and rate of further warming. If GHG emissions are cut immediately, warming could be contained to 2.0C, a figure that is believed to be the maximum tolerable warming level before catastrophic problems begin to occur. If emissions are not drastically reduced, the IPCC predicts temperatures could increase by 6.4C by the end of the century.<sup>59</sup> These figures do not include increases due to feedback loops, which could lead temperatures to rise by 12C by the end of the century.<sup>60</sup> Temperature increases in this range will likely lead to a severe crisis across all global food systems. Societies should not let this warming take place.

The unpredictability of climate change is exacerbated by the possibility of feedback loops. These occur when an environmental stress reaches a breaking point and triggers another series of environmental problems. The frozen peat bogs of Siberia and

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<sup>54</sup> Larry E. Shrader et al., “Two types of sunburn in apples caused by high fruit surface (peel) temperatures,” *Plant Health Progress*, 2001. <http://www.plantmanagementnetwork.org/pub/php/research/sunburn/>

<sup>55</sup> U.S. Global Change Research Program, National Climate Assessment, Washington, D.C: <http://nca2014.globalchange.gov/report/sectors/agriculture> (Accessed October 14, 2014)

<sup>56</sup> Ibid.

<sup>57</sup> Peter Kuitenbrouwer, “As weather warms, Ontario’s apple blossoms fade,” *The National Post*, May 8, 2012. <http://news.nationalpost.com/2012/05/08/as-weather-warms-ontarios-apple-blossoms-fade/>

<sup>58</sup> IPCC, *AR4*, 49.

<sup>59</sup> IPCC, *AR4*, 45.

<sup>60</sup> Gerard Roe, “Feedback, Timescales, and Seeing Red,” *Annual review of Earth and Planetary Science* 37 (2009): 97.

permafrost in Northern Canada are important examples.<sup>61</sup> Experts predict that as the peat bogs and permafrost begin to thaw, they will release massive quantities of carbon and methane gas into the atmosphere, further accelerating warming.<sup>62</sup> Another accepted feedback is the predicted melting of world's ice caps (known as the cryosphere), which could release trapped methane and reduce surface area of reflective white ice that sends the sun's rays back into space. These are just two examples of the many serious possibilities.<sup>63</sup>

A situation where multiple feedbacks trigger further feedbacks is called the climate "tipping point." The tipping point is "the moment at which internal dynamics start to propel a change previously driven by external forces."<sup>64</sup> At that point, humans will have little ability to control or correct damage done to the climate. Many scientists predict that the earth is nearing this point. A small academic community is attempting to develop scientific models for predicting the climate tipping point.<sup>65</sup> Policy makers and producers should monitor updates on these projections closely.

### **The Importance of Emission Reductions**

The task of reducing emissions is vitally important for all nations. Less developed nations already emit far fewer emissions per capita than developed nations, meaning that developed countries will likely need to make more drastic emission cuts to create greater parity with developing nations on per capita emissions, and to compel developing nations to contribute to global emissions reductions.<sup>66</sup> While there is no definitive figure on how

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<sup>61</sup> Edward A. G. Schuru et al., "Vulnerability of permafrost carbon to climate change: Implications for the global carbon cycle," *Bioscience* 58, no. 28 (2008): 701.

<sup>62</sup> Charles D. Koven et al., "Permafrost Carbon Climate Feedbacks Accelerate Global Warming," *Proceedings of the National Academy of Sciences of the United States of America* 108, no. 36 (2011): 14772.

<sup>63</sup> For a more detailed analysis of potential feedbacks, and how they may be triggered, see: Terry V. Callaghan et al., "Feedbacks and Interactions: From the Arctic Cryosphere to the Climate System," *Journal of the Human Environment* 40, (2011): 76-79

<sup>64</sup> Gabrielle Walker, "The Tipping Point of the Iceberg," *Nature* 441, no. 15 (2006): 802.

<sup>65</sup> Gerald H Roe and Marcia H. Baker, "Notes on a Catastrophe: A Feedback Analysis of Snowball Earth," *Journal of Climate* 37 (2009): 93.

<sup>66</sup> Canadians, including British Columbians, are among the highest GHG emitters in the world. This is in large part due to the large amount of fossil fuels citizens use daily. British Columbians emit an average of 15.7 tons of CO<sub>2</sub> per capita per year. These numbers are comparable to the per-capita Canadian average of 17.27 tons and American average of 19.18 tons. Unfortunately they are still far higher than the emissions release by the majority of the world's citizens; the Chinese per-capita average is 4.91 tons, the Brazilian average is 2.18 tons, and the Indian average is 1.31 tons. For more comprehensive information, see Union of

drastically emissions should be cut, the IPCC estimates that global carbon levels must peak at 450 ppmv before drastically receding by 2050.<sup>67</sup> Others, such as NASA climatologist James Hansen say these numbers are too conservative. Hansen believes that carbon levels must be reduced to 350 ppmv to maintain the level of ecology that allowed societies to flourish and avoid “irreversible catastrophic effects.”<sup>68</sup> In order to achieve these reduction levels, major changes should be made to economic and agricultural systems.

Perhaps ironically, successful efforts to confront climate change will have two major impacts on agricultural systems. First, food systems are heavily dependent on high-emission industries such as energy production, transportation, manufacturing, and retail. Fossil fuel energy is the primary reason agriculture systems have expanded rapidly over the past century. Fossil fuels are used to produce fertilizers and chemicals, power machinery to plant, harvest and transport food, and power to process, store and cook food. Fossil fuel energy is so integral to production that some claim we are “eating fossil fuels.”<sup>69</sup> Research by Pimentel et. al shows that shows that the average American diet requires 2000 litres of oil equivalents per year to supply their food, which accounts for 19% of the total energy use in the United States.<sup>70</sup>

Second, food systems create their own emissions, through land clearing, crop production, animal husbandry, transportation, processing, disposal, and residential food preparation. Current climate studies show that the global agriculture system is responsible

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Concerned Scientists, *Each Countries Share of CO2 Emissions*, Citizens and Scientists for Environmental Solutions, 2011. [http://www.ucsusa.org/global\\_warming/science\\_and\\_impacts/science/each-country-share-of-co2.html](http://www.ucsusa.org/global_warming/science_and_impacts/science/each-country-share-of-co2.html)

<sup>67</sup> IPCC, *AR4*, 45.

<sup>68</sup> James Hansen et al., “Target Atmospheric CO<sub>2</sub>: Where Should Humanity Aim?,” *The Open Atmospheric Science Journal* 2, no.1 (2011): 217-22.

<sup>69</sup> This term is taken from Dale Allen Pfeiffer’s book “Eating Fossil Fuels,” which provides a comprehensive overview of fossil fuel use in the modern food system. Pfeiffer explores the history of our dependence on fossil fuels for food production, and looks at where they are most commonly used in the food system. He reviews the negative environmental implications associated with fuel-based farming, including their contribution to the destruction of local food economies. His conclusion is that a fuel-based food system is unsustainable, and potentially catastrophic in the long-term: Dale Allen Pfeiffer, “Eating Fossil Fuels: Oil, Food, and the Coming Crisis in Agriculture,” Gabriola Island: New Society Publishers, 2006.

<sup>70</sup> Pimental et. al, “Reducing Energy Inputs in the US Energy System,” *Human Ecology*, 36, no.4 (2008), 458-471.

for producing 10% to 12% of worldwide GHG emissions.<sup>71</sup> The IPCC estimates that current trends of population growth and dietary shifts will increase agriculture emissions by 50% by 2050.<sup>72</sup> Ostry et al. emphasizes that animal production creates nearly 65% of agricultural emissions in Canada.<sup>73</sup>

Any efforts to reduce emissions drastically, both internationally and within British Columbia, will impact each of these areas, and will likely reduce the efficiency and productivity of these systems unless viable alternatives can be found. For example, research suggests that emission reductions of 65 percent on industrial farms (through no-till and organic methods) will reduce yields by 30-40 percent.<sup>74</sup> Consumption shifts to reduce calorie intake, or shifts towards vegetarian or vegan diets, can help offset this transition, but this will require widespread change by individual consumers.

### **Fertilizer Production**

Artificial fertilizers have also played an essential role in yield increases throughout the past century. The most important man-made fertilizer for agriculture are nitrogen-based. The discovery of an extraction process for nitrogen in the early 20<sup>th</sup> century was one of history's most important farming innovations. The Haber-Bosche process "works by combining nitrogen and hydrogen gases under immense heat and pressure in the presence of a catalyst. The heat and pressure are supplied by prodigious amounts of electricity, and the hydrogen is supplied by oil, coal, or most commonly today, natural gas – fossil fuels."<sup>75</sup>

Manufactured nitrogen gives farmers the ability to increase yields drastically, particularly for staple crops such as corn, soy, and wheat. In 2008, annual global usage of agricultural nitrogen was 139.8 million tons.<sup>76</sup> The heavy reliance on manufactured nitrogen is dangerous for three reasons: the process relies heavily on fossil fuels; nitrogen use is damaging to natural ecosystems (particularly through runoff into rivers); and

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<sup>71</sup> International Panel of Climate Change, *Chapter 8: Agriculture*, IPCC Forth Assessment Report: Climate Change, 2007.

<sup>72</sup> IPCC, *AR4*, 45.p503-505

<sup>73</sup> Ostry, *Food Security*, 16.

<sup>74</sup> Phillip Woodhouse, "Beyond Industrial Agriculture: Some Questions about Farm Size, Productivity, and Sustainability," *Journal of Agrarian Change* 10, no.3 (2010): 444.

<sup>75</sup> Michael Pollan, *The Omnivore's Dilemma*, (New York: Penguin, 2007), 44.

<sup>76</sup> Anna Lappe, *Diet for a hot planet*, (New York: Bloomsbury, 2010), 15.

nitrogen use has caused a massive increase in atmospheric nitrous oxide levels. The heavy dependence on fuel-derived fertilizers and pesticides has made the entire global industrial food system (as it stands) extremely vulnerable to efforts to reduce GHG emissions.

### **Conclusion**

Climate research clearly shows that a warming atmosphere will have major implications for modern food systems. These problems are inevitable, unpredictable, and difficult to mitigate. If societies are able to reduce emissions, the most serious impacts of climate change could be minimized. Unfortunately, these reductions will also have significant impacts on food production. To date there have been very few strong emission commitments. Even British Columbia, which made the strict commitment to reduce emission by 80% by 2050, has already stated that these targets could be compromised as the province looks to develop its massive natural gas reserves.<sup>77</sup>

This research highlights the need to make drastic changes within B.C.'s food economy. The following chapter will summarize why B.C.'s food system is unprepared for the effects of climate change. B.C. is over-exposed to climate problems in key import regions such as California and Mexico, while internal problems such as low domestic production, limited farmland and a growing population will limit efforts to reform the provincial food system.

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<sup>77</sup> Tyler Bryant, "B.C.'s natural gas ambitions not in keeping with climate leadership," *David Suzuki Foundation*, November 19, 2013. <http://www.davidsuzuki.org/blogs/climate-blog/2013/11/bcs-natural-gas-ambitions-not-in-keeping-with-climate-leadership/>

## Chapter 3 – Current State Analysis: Weaknesses in British Columbia’s Food System

In its present state, British Columbia’s food system is unprepared to adapt quickly to the problems that will be created by climate change. B.C. farms are only capable of producing 48 percent of the food consumed in the province.<sup>78</sup> A large portion even of this figure is production is allocated to export markets, meaning that B.C. farms produce far less than 48 percent of actual provincial food consumption. British Columbia’s heavy reliance on imports makes the province deeply vulnerable to problems in the agricultural regions that supply the remainder of its food requirements. Furthermore, agriculture in B.C. creates its own emissions that will need to be reduced to achieve sustainable GHG emission levels. This chapter will provide a brief overview of the key vulnerabilities within this system.

### Lack of Agricultural Diversity

In addition to British Columbia’s small annual production, the agricultural food system lacks diversity in a number of ways. To begin with, B.C. farms produce a small number of crops in comparison to the diversity a healthy human diet requires and compared to the diversity required to withstand the collapse of key crops, such as greenhouse vegetables, blueberries, wild salmon or tree fruits. Furthermore, production in B.C. is focused on three relatively small areas: the Fraser Valley, the Okanagan, and Vancouver Island. This lack of diversity makes B.C.’s food system vulnerable to failures in specific crops or regions.

Food production in British Columbia is focused on a small number of goods, including dairy, chickens, cattle, eggs, tree fruits, blueberries, and greenhouse grown tomatoes, peppers, and cucumbers.<sup>79</sup> Production of vegetables and grains, two staples of a healthy diet, is low in British Columbia; the province only produces 14% of its grain requirements, and 43% of vegetable requirements. Although the latter vegetable

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<sup>78</sup> British Columbia. Ministry of Agriculture. *B.C.’s Food Self Reliance: Can B.C.’s Farmers Feed Our Growing Population*. Victoria, B.C.: Government of British Columbia, 2007, 1.  
[http://www.agf.gov.bc.ca/resmgmt/Food\\_Self\\_Reliance/BCFoodSelfReliance\\_Report.pdf](http://www.agf.gov.bc.ca/resmgmt/Food_Self_Reliance/BCFoodSelfReliance_Report.pdf)

<sup>79</sup> Canada. Statistics Canada. *Farm Cash Receipts, by Province (quarterly)(British Columbia)*. (Ottawa), 2013.  
<http://www.statcan.gc.ca/tables-tableaux/sum-som/101/cst01/agri04k-eng.htm>

production levels seem high, most of this production is in the hot-house industry, which as mentioned, concentrates on limited varieties of goods for the export market and requires significant energy inputs (natural gas) to heat growing rooms. When provincial production is compared to the nutrition recommendations set out by *Canada's Food Guide to Healthy Eating*, production levels drop to 34%.<sup>80</sup> This means that B.C. farms do not produce the types of foods required for a healthy human diet. Again, a significant portion of this 34% is exported.

British Columbia's food system also lacks regional diversity. Together, the Fraser Valley, Okanagan Valley and southern Vancouver Island produce nearly 86% of total dollar value<sup>81</sup> of food produced in the province.<sup>82</sup> This regional concentration leaves many Northern and Interior regions heavily reliant on food imports. These regions currently rely on heavy transportation systems to provide food, but higher fuel prices (perhaps due to strict GHG legislation) could raise prices or limit the ability of these regions to import. B.C.'s primary agricultural regions are also the most populated regions, meaning that population growth will increase development pressure on this land.

Due to cool winters and springs, B.C.'s farms lack the seasonal diversity of regions such as California and Mexico. Although B.C. temperatures are milder than the Canadian Prairies, the majority of provincial farms can only produce food for 3-5 months through the summer season, leaving a shortage of fresh fruits and vegetables in the winter months. Policies to encourage farmers to grow winter crops (e.g. kale), and crops that can keep throughout the winter (e.g. squash and root vegetables) would be beneficial, such as tax relief or grants for winter greenhouses, but such changes would also require a shift in dietary habits to consume more of these products.

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<sup>80</sup> *B.C.'s Food Self Reliance*, 1.

<sup>81</sup> Dollar value metrics are only one method used to determine regional food production, and may be skewed by the higher value of luxury food crops such as soft-fruits in the Okanagan Valley, or blueberries in the Fraser Valley.

<sup>82</sup> British Columbia. Ministry of Agriculture. *The British Columbia Agriculture Plan: Growing a Health Future for B.C. Families*. Victoria, B.C.: Government of British Columbia, 2006, 13.  
[http://foodsecurecanada.org/sites/default/files/Agriculture\\_Plan.pdf](http://foodsecurecanada.org/sites/default/files/Agriculture_Plan.pdf)

### Unstable Import Sources

In addition to low domestic production and a lack of diversity, British Columbia's food system is heavily reliant on increasingly unstable food imports. B.C.'s imports are unstable for two reasons: first, many import regions are extremely vulnerable to the impacts of climate change for many of the reasons discussed above (e.g. drought in California or Mexico).<sup>83</sup> Secondly, regions that far away (e.g. Europe, Australia or South America) cannot be considered secure due to heavier reliance on fossil-fuel powered transportation and cold storage. Even if more efficient transportation systems are found, the IPCC suggests that growing demand for these services may negate emissions reductions. As a result, they conclude that "large increases in prices or taxes are required to make major changes in GHG emissions."<sup>84</sup> In addition to transportation issues, B.C. is heavily reliant on food imports from regions that will be required to reduce overall emissions (including agricultural emissions), such as the United States, if they are to comply with suggested emission reduction levels. These reductions could easily impact food production and import availability to B.C.

A comprehensive study of import/export information can be found in Ostry et al. (2011). Their data shows that the United States is by far the largest supplier of food to British Columbia. A majority of imported fruits and vegetables come from California, a region highly susceptible to climate-related drought. In 2007, "approximately 70% of fats [dairy fats] and vegetables, 60% of cereals, fruits and nuts and fish, 50% of the shellfish, and 40% of the meat imported into B.C. came from the United States."<sup>85</sup> The other two main sources of B.C.'s vegetables, Mexico (17%) and China (7%), require even longer distance travel, often with fossil-fuel powered cooling units. B.C. is one of many global regions that imports food from these productive agricultural areas and despite current trade agreement protections for market-determined trades regardless of local needs, it would be hazardous to assume that B.C. will receive priority imports from these regions in periods of food shortages. Imports could be sent to countries who can pay the highest

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<sup>83</sup> Amy Lynd Luers et al., "Our Changing Climate : Assessing the Risks to California" A summary report prepared for the California Climate Change Centre, July 2006.  
[http://meteora.ucsd.edu/cap/pdffiles/CA\\_climate\\_Scenarios.pdf](http://meteora.ucsd.edu/cap/pdffiles/CA_climate_Scenarios.pdf)

<sup>84</sup> <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter5.pdf>

<sup>85</sup> Ostry et al., *Food Security*, 9.

price, but these producer regions could equally supply their own country first, or another nation which can offer a better exchange for particular goods or services.

### Limited Farmland

Despite a range of solutions that could increase domestic production, agriculture potential in British Columbia is constrained by a very limited supply of quality farmland. Unlike neighbouring Prairie Provinces, or large fertile regions such as California, most of B.C. is covered by rocky, mountainous, or snow-covered terrain that cannot be used for plant production. Only 3 percent of provincial land is suitable for growing crops, less than 1 percent is considered prime agriculture land, .06% is considered “Class 1” farm land<sup>86</sup>, and only .04% is suitable for tree-fruit production.<sup>87</sup> Cropland loss is a significant problem in British Columbia, as it is around the world. Prior to the implementation of the ALC in 1973, B.C. was losing 3,000 acres of land annually.<sup>88</sup> From 1973 to [2009], B.C. lost 139,000 hectares of mostly “prime” and “secondary” land.<sup>89</sup> (Internationally, between five and seventeen million hectares of farmland are lost yearly to development, urbanization and highways.<sup>90</sup>)

Statistics from the Agricultural Land Commission (ALC), a government body discussed further below, provide more precise information on B.C.’s shortage of farmland. As of [year], the ALC’s Agriculture Land Reserve (ALR) zoning designation protects 4.7 million hectares. Of this, only 2.5 million hectares are classified as arable land that can be used for farming. Of this arable total, 600,000 hectares are currently used

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<sup>86</sup> The Agricultural Land Reserve is divided into seven distinct land classifications, based on the quality of soil and climate conditions. Class 1 land is defined as land that is “capable of producing the very widest range of crops. Soil and climate conditions are optimum, resulting in easy management.” British Columbia, Agricultural Land Commission. “Agriculture Capability,” Victoria, B.C.: Government of British Columbia. [http://www.alc.gov.bc.ca/alr/Ag\\_Capability.htm](http://www.alc.gov.bc.ca/alr/Ag_Capability.htm) (Accessed March 2nd, 2013).

<sup>87</sup> British Columbia. Ministry of Agriculture. *Stakes in the Ground: Provincial Interest in the Agriculture Land Commission Act*. Victoria, B.C.: Government of British Columbia, 2008. <http://www.agf.gov.bc.ca/polleg/quayle/stakes.htm>

<sup>88</sup> Andrew Petter, “Sausage making in British Columbia’s NDP Government: The Creation of the Land Commission Act, 1972-1973,” *BC Studies* no.65 (1985): 5.

<sup>89</sup> British Columbia. Office of the Auditor General. *Audit of the Agricultural Land Commission*. Victoria, B.C.: Government of British Columbia, 2010, 9. [http://www.alc.gov.bc.ca/publications/OAGBC\\_AgriculturalLandCommission\\_Final\[1\].pdf](http://www.alc.gov.bc.ca/publications/OAGBC_AgriculturalLandCommission_Final[1].pdf)

<sup>90</sup> David Pimentel, “Food for thought: A review of the role of energy in current and evolving agriculture,” *Critical Reviews in Plant Sciences* 30 no.1 (2011): 37.

for production, 233,000 are used for pastureland, and 1.2 million acres are unused.<sup>91</sup> This unused land is not considered prime agricultural land, and little research is available on its productive capacity. Most unused farmland in B.C. does not have direct water access, which complicates efforts to bring it into production. Furthermore, most of this unused land is located in northern regions surrounding Prince George and Dawson Creek. Recently, farmland in the northeast has faced increased pressure as the gas fracturing industry expands.

### **Increasing Population and Aging Farmers**

In addition to the problems discussed above, a growing population and aging farmers will further challenge B.C.'s food system. Although long-term demographics (50-100 years and beyond) are difficult to predict in B.C., one influential estimate suggests the provincial population could increase from 4.5 million to 6.1 million people by 2036.<sup>92</sup> In order to feed this growing population, in 2025 B.C.'s domestic farms will need to produce 30% more food than 2001 levels, just to maintain current production levels.<sup>93</sup>

If B.C. farms are unable to increase or maintain production due to climate problems or limited farmland, B.C.'s growing population will require more imports. But food imports will also be challenged both by climate threats and by an increasing global population that will also require more food calories. Globally, the current population of 7 billion is projected to increase to 10.0 billion people by 2100.<sup>94</sup> This growth will require new farms, new farm technologies, and/or new dietary habits, including seasonal diets or reduced meat consumption.

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<sup>91</sup> British Columbia. Ministry of Agriculture. *Fast Stats: Agriculture, Aquaculture, and Food in 2006*, Access. Victoria, B.C.: Government of British Columbia, 2006.  
<http://www.agf.gov.bc.ca/stats/faststats/FastStats2011-lo.pdf>

<sup>92</sup> British Columbia. BC Stats. *British Columbia Population Projections, 2011-2036*. Victoria, B.C.: Government of British Columbia, 2011.  
[http://www.bcstats.gov.bc.ca/data/pop/pop/project/BCtab\\_1105.pdf](http://www.bcstats.gov.bc.ca/data/pop/pop/project/BCtab_1105.pdf)

<sup>93</sup> *B.C.'s Food Self Reliance*, 12.

<sup>94</sup> These figures are from the "medium projections" from the United Nations by-annual population report. High projections put population at 15.8 billion people by 2100, while low projections show population peaking at 8.1 billion in 2046, then reducing to 6.1 billion by 2100. United Nations Department of Economic and Social Affairs, *World Population Prospects – the 2010 Revision*, "Total Population, both sexes." <http://esa.un.org/unpd/wpp/Excel-Data/population.htm>

B.C.'s farmers are also aging. Forty-one percent of farmers in B.C. are over fifty-five, meaning many will reach the age of retirement in the next decade.<sup>95</sup> As these experienced farmers leave the workforce, they take with them the skills and knowledge gained from a lifetime involved in the agriculture industry. Finding new and young farmers to purchase or lease their land and replace the retirees is vital.

Although younger generations may be interested in agriculture as a career, the high land costs in B.C. also pose a significant barrier to entry. Current land values are at record highs, especially in B.C.'s most productive and populated regions. Policy-makers can aid this transition in many ways, including agriculture education programs, industry transition programs, apprentice programs, labour tax credits, and low-cost land lease programs.

## **Conclusion**

This section provides a high-level summary of the weaknesses within British Columbia's current food system. Other key challenges should also be considered, along with issues such as food affordability and population health, as B.C. prepares for a warming world. These limitations, viewed within the context of known climate threats, highlight the need to make significant changes to B.C.'s food economy. Proactive changes to the food system will reduce the likelihood that climate change will create food shortages, cost spikes or social unrest in B.C.

The next chapter argues that enhanced resilience of the food system is one specific way to prepare for the impact of climate change. A resilient food system can quickly adapt to new climate scenarios while maintaining productivity. The following chapter reviews the academic literature on resilience and discusses ways that B.C. can develop the latter. A discussion follows of specific policies to develop resilience in B.C. agriculture.

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<sup>95</sup> *British Columbia Agriculture Plan*, 20.

## Chapter 4: Exploring Agricultural Resilience: The Role of Small-Scale Agriculture and Local Food Systems

This chapter argues that an effective way to prepare a food system for the impacts of climate change is to enhance the system's resilience. The resilience movement is focused on building a food system that can quickly adapt to changing circumstances without losing functionality. Brenda Lin defines resilience as “the ability of a system to retain its organizational structure and productivity following a perturbation.”<sup>96</sup> A resilient future food system depends on pro-active policy change now to prepare for future threats, and will be able to adapt to new climatic situations more readily and quickly. Where past food systems have striven primarily for productivity in dollar terms, a resilient system will also aim for flexibility, diversity, and sustainability.

Unfortunately, research on the resilience of agriculture systems and food economies is limited.<sup>97</sup> Resilience can also be explored on different levels, such as on an individual farm, within a community or region, or across a province or nation. Agricultural resilience research should explore both biological perspectives and the social and economic factors that impact food production and consumption. To understand better how to enhance resilience in a food system, this thesis uses three principles from a literature review of social and ecological resilience that highlight how a food system can develop resilience. These principles are intended to be broad policy guidelines only. To increase resilience, B.C. can:

- 1) Increase domestic food production in order to boost B.C.'s self-sufficiency and offset the reliance on imports from unstable regions.
- 2) Establish greater diversity in all elements of the food system including crops, production methods, seasonal diversity, urban/rural diversity, farm size, farmer age, and consumption habits. Diversity builds redundancy into a system so that failures in one area (crop, region, import source, farm input) can be counterbalanced by stronger elements of the system.
- 3) Build flexibility by capitalizing on the natural flexibilities inherent in different scales of farming. This includes the unique adaptive capacity of small-scale

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<sup>96</sup> Brenda B. Lin, “Resilience in Agriculture through crop diversification: Adaptive management for environmental change,” *Bioscience* 61, no.3 (2011): 183.

<sup>97</sup> Lin, *Resilience in Agriculture*, 183.

agriculture and strong local food systems, which can complement the productivity associated with large-scale production and international agribusiness. Greater policy coordination between policy makers and farmers, and between policy makers in issue-areas peripheral to food production but related to it (health, education, finance, environment, and community development) can also increase flexibility through more comprehensive policy solutions and quicker problem anticipation.

## Resilience Literature

### *Holling, Resilience, Connectedness, and Adaptability*

One of the first studies on resilience theory was C.S. Holling's analysis of ecological systems in "Resilience and the Stability of Ecological Systems."<sup>98</sup> Holling breaks down traditional methods of understanding ecological systems, which in the past generally involved calculating a direct deviation from a chosen equilibrium; Holling comments that "although the equilibrium-centred view is analytically more tractable, it does not always provide a realistic understanding of the system's behaviour."<sup>99</sup> For example, the introduction of a new predator species into an ecosystem does not necessarily mean that prey species will be reduced at a corresponding rate. Instead, Holling outlines how one small change, such as the introduction of a new species or change in weather, can trigger a host of problems that could provoke a major collapse of the ecosystem. Using the example of a forest, Holling shows how complex ecological systems are, making them susceptible to rapid transformations, including full collapse, depending on the timing and magnitude of external and internal variables. For Holling, the system's level of resilience determines how small or large fluctuations will be in the event of a shock.

One of Holling's key resilience concepts is that ecological systems go through a natural *adaptive cycle* of growth, complexity, collapse, regeneration, only to begin the growth phase again. In the example of a forest, biomass increases rapidly during the initial extended growth phase, during which it gains much diversity, and develops many complex relations between different plants and animals. Holling calls this the forest's

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<sup>98</sup> C.S. Holling, "Resilience and the Stability of Ecological Systems," *Annual Review of Ecology and Systematics* 4, (1973).

<sup>99</sup> Holling, "Resilience and the Stability of Ecological Systems," 16.

“connectedness.”<sup>100</sup> As connectedness increases between millions of life forms, Holling argues that the forest’s resilience begins to decline: as connectedness increases, the plants, animals and insects in the forest develop a precise range of habits that allows them to operate most efficiently. This efficient ecological organization works well until the forest experiences an outside shock such as a fire, drought, or new pest invasion. Once a shock hits a highly connected system, the living elements in the forest are unlikely to develop or adapt new ‘skills’ rapidly enough. This inability to adapt may cause an external shock that is more catastrophic than if the same shock happened to a less connected system. His central premise is that as connectedness increases resilience declines.

While British Columbia’s trade relationship with California is economically efficient, or “connected,” it is unlikely that B.C. could rapidly switch to alternative food sources if California experienced a major drought that drastically limited its ability to produce food. Furthermore, a drop in California production does not necessarily mean a corresponding drop in B.C. imports – it could create a significant food shortage by reshaping global food trade.

In his book *The Upside of Down*, Thomas Homer-Dixon supports Holling’s work by recognizing that a system (e.g. a provincial food system) that has multiple input sources (more diversity) is more resilient than a system with fewer inputs, or only one input (all imports, or all domestic production). This can apply at the level of an individual farm or the food system as a whole. Homer-Dixon states that a balanced level of connectedness is the best defense against an external or internal threat:

When it comes to connectivity in its networks, a resilient system... has neither too much nor too little connectivity. In a resilient system, individual nodes – like people, companies, communities, and even whole countries – are able to draw on support and resources from elsewhere, but they’re also self-sufficient enough to provide for their essential needs in an emergency.

<sup>101</sup>

This suggests that a resilient system must find a secure balance between external sources and internal productivity. Unfortunately, there is little research available on the ideal level of internal production required to maximize resilience. This research is complicated

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<sup>100</sup> Ibid, 226.

<sup>101</sup> Thomas Homer-Dixon, *The Upside of Down*, (Toronto: Vintage Publishers, 2007), 286.

by the unique social and geographical limitations of certain regions (e.g. B.C.'s limited farmland base), and also depends on the severity and impacts of future climate problems. Policy makers could benefit from further research on this area to help inform policies designed to increase provincial production.

### **External Cycles**

A second contribution from Holling's work is the notion that no adaptive cycle ever exists in total isolation.<sup>102</sup> Holling uses a forest ecosystem to show that hundreds of different adaptive cycles take place as a system develops. Above the forest is the atmospheric system that is going through its own cyclical process: this involves carbon, nitrogen, and oxygen rotating in the air and changing global temperatures. Because changes in this cycle take place much more slowly, the forest can rely on the atmosphere to be in a similar state when it begins its growth phase again. Underneath the forest floor are the bacteria, fungus, and nutrients that go through a more rapid cyclical process than the forest itself. If the forest ecosystem collapses, these external cycles will ideally be stable, making it easy for the forest to rely on them for growth. Holling suggests that in certain situations, all three cycles can align at the "same phase of vulnerability,"<sup>103</sup> which increases the chance of a major system collapse.

Holling's research on multiple external system "cycles" also supports the argument that British Columbia should strengthen and expand its domestic food system to increase resilience. Modern food systems rely on multiple external "cycles" such as a stable precipitation and climate, low cost energy (oil and electricity), global transportation networks, access to chemical fertilizers and pesticides, and readily available food imports. If any of these systems change – perhaps due to strict GHG legislation, rapidly advancing global warming or peak oil – it may be very difficult for the existing food system to rebuild itself quickly.

### **Diversity and Resilience**

Another key principle of resilience theory is the role of diversity. Diversity is the quality of having many forms or characteristics. Diversity can apply to many aspects of

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<sup>102</sup> Ibid, 229

<sup>103</sup> C.S. Holling, "Understanding the Complexity of Economic, Ecological, and Social Systems," *Ecosystem* 4, no. 5 (2001): 394.

the food system – crops on the farm, crop rotation schedules, production techniques, water sources, incomes for farming families, regions producing food, urban production, seasonal production, import sources and consumption habits. As climate threats appear, greater diversity can help ensure that problems with one crop, region or import source will not threaten the functionality of the entire system. If one crop or region fails, others can make up for lost production.

Lin's research on on-farm diversity highlights its importance. Lin describes multiple on-farm improvements, including the use of structural diversity, which can be achieved by mixing crops of differing heights, which can increase diversity. Other improvements include genetic diversification, mixing production crops with non-crops, crop rotation practices, polyculture farming, agroforestry, and mixed landscapes. Implementing these techniques can help defend a farm against pests, diseases, and climate variability, while simultaneously boosting production and protecting farm income.<sup>104</sup> Lin sums up the contributions of diversity to resilience:

First, biodiversity enhances ecosystem function because different species or genotypes perform slightly different role and therefore occupy different niches. Second, biodiversity is neutral or negative in that there are many more species than there are functions; thus redundancy is built into the system. Third, biodiversity enhances ecosystem function because those components that appear redundant at one point in time may become important when some environmental change occurs. The key here is that when environmental change occurs, the redundancies of the system allow for continued ecosystem functioning and provisioning of services.<sup>105</sup>

The benefits of diversity were evident in my interviews with two apple farmers in the South Okanagan, who were well aware that a bad hailstorm could quickly destroy an entire crop. For example, Farmer #4, who produced mainly apples, had lost 75% of his crop one season, due to a single fifteen-minute hail storm. Farmer #2, a polyculture grower, lost an entire crop of broccoli to an unknown fungus at the time of our interview. While Farmer #4 had to rely on crop insurance to make up for the income shortfall, Farmer #2 relied on income from other productive crops.

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<sup>104</sup> Lin, *Resilience in Agriculture*, 185.

<sup>105</sup> Lin, *Resilience in Agriculture*, 183-184.

On most industrial farms, diversity is seen as an inefficient practice, decreasing the economies of scale from monoculture production and industrial processing. Large-scale fruit and vegetable farms, often thousands of hectares in size, regularly grow a single crop or at most a small handful. Monoculture farming allows a farmer to standardize stages of production: crops are planted at the same time, ripen at the same time, and are harvested at the same time.<sup>106</sup>

Unfortunately, this standardization has come at a high cost for diversity, sustainability and resilience.<sup>107</sup> Laidlaw highlights the extent of the current loss of diversity:

Farmers seeking the efficiencies offered by growing huge fields of identical crops abandoned thousands of traditional varieties or plants. In North America, only 5 to 20 percent of the crops grown a hundred years ago are still in commercial production. Ninety-one per cent of the tomatoes grown a century ago, and 90 percent of the peas, are no longer available to farmers. According to the United Nations Food and Agriculture Organization, in China, 90 percent of the wheat varieties grown sixty years ago have been lost, and in Mexico, where corn was first domesticated, only 20 percent of the corn varieties harvested in the 1930s are still grown. The FAO reports that just 120 species of plants provide 90 percent of the crops eaten by humans, and that 90 percent of the agriculture diversity on farms a century ago no longer exists.<sup>108</sup>

As previously outlined, agriculture in British Columbia also lacks crop diversity. The international demand for B.C. products like blueberries, hot-house vegetables and salmon is economically valuable for the province, but reduces the internal diversity within the food system and makes the province more vulnerable to sudden climate threats. For example, a sudden threat (e.g. increased frequency of hail) to the massive fruit industry in the Okanagan Valley could drastically reduce an essential provincial crop. Fruit trees take five to ten years to reach peak production, so re-planting to avoid, mitigate, or recover

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<sup>106</sup> Thomas A. Lyson and Rick Welsh, “The Production Function, Crop Diversity, and the Debate between Conventional and Sustainable Agriculture,” *Rural Sociology* 58, vol 3 1993, 424-439.

<sup>107</sup> Monoculture farming not only reduces the diversity of a food system, but it associated with a host of other environmental “externalities” that decrease the long term sustainability and resilience of these farms, including “soil erosion and salinization, the overdraft of water and threats to its long-term supply; the loss of biodiversity and crucial “ecosystem services” (e.g. pollination, soil formation); and greenhouse gas (GHG) emissions.” Weis, *The Accelerating Biophysical Contradictions of Industrial Capitalist Agriculture*, 316.

<sup>108</sup> Stuart Laidlaw, *Secret Ingredients: The Brave New World of Industrial Farming*, (Toronto: McClelland & Stewart, 2004), 97.

from a climate threat such as sun damage (from excessive temperatures) or hail could be difficult and expensive for farmers. Increasing diversity in all aspects of B.C.'s food system, including key areas such as crop diversity, diversification of the generations of would-be farmers with access farmland, and consumption habits, is an essential step to enhance the resilience of the system.

### **Flexibility and Resilience**

In addition to robust internal production and greater diversity, stewards of a resilient system must seek ways to ensure it can quickly adapt to new climate scenarios. Flexibility allows the system to easily adapt to external or internal problems, or new opportunities in technology, farm techniques, or policy changes. Although many qualities of diversity and flexibility are shared, flexibility highlights unique adaptive capacities associated with small-scale agriculture and local food systems. The first part of this section explores how flexibility can be created by capitalizing on unique characteristics of different scales of farms and agri-businesses, and the second half will explore the contribution of stronger information networks between farmers, and between policy communities.

Academic literature on flexibility and food systems is limited, but analogies from other ecological systems are readily available. Rosemary E. Ommer and the Coasts Under Stress Research Project Team present a valuable work on system flexibility in their study of Canada's fishing economy on the Pacific and Atlantic coasts.<sup>109</sup> Ommer and her team assess the historical resilience of these fisheries, concluding that the resilience of the fishing economy and ecosystem rapidly diminished over the past century due to poor government management, loss of traditional fishing communities to large-scale corporatization, and disregard for ecosystem management. Numerous similarities between agriculture and fisheries make this research relevant, including the susceptibility to climate change, recent industrialization, and the need to consider local communities and ecosystems. Both industries are also regulated by provincial and federal governments, and are strongly shaped by government policies and programs.

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<sup>109</sup> Rosemary E. Ommer and the Coasts Under Stress Research Project Team, *Coasts Under Stress: Restructuring and Social-Ecological Health* (Montreal: McGill-Queens University Press, 2008).

Ommer's team suggests that flexibility can be enhanced by strengthening local ecosystems and by capitalizing on the unique flexibilities associated with different scales of actor in a system. This suggests that a more balanced reliance on food produced by small-, medium-, and large-scale farms could complement one another, providing unique characteristics with regard to flexibility.

Although large-scale agriculture is highly productive, the significant financial investment that these farms make in production machinery, processing facilities and retail networks means that they find it very difficult to adapt quickly to sudden weather threats. Similarly, mono-crop blueberry farms and tree-fruit producers in British Columbia have invested significant amounts in farm equipment and plants, and will hesitate to tear out crops in response to yearly climate threats, such as flooding or more frequent hail storms. In comparison, small-scale producers do not require expensive machinery or facilities, and are therefore nimbler in responding to external changes.<sup>110</sup> For example, if consumers suddenly demand vegetables that will keep throughout the winter, a small farmer can quickly plant more squash the following season; by contrast, a mid-sized fruit farmer who has invested heavily in apple trees and production equipment may be reluctant to do so in the short term.

Ommer acknowledges that fisheries corporations have developed new ways to be flexible on a large scale<sup>111</sup>, but their expansion has come at the cost of much of the "flexibility that used to be part of the traditional rural economy."<sup>112</sup> Ommer's research explores the flexibility of traditional rural fishing economies, based on diversified production, multigenerational knowledge, multitasked production, and a strong understanding of local ecosystem management. A system that relies on local ecosystems should re-establish these qualities to maximize flexibility:

The challenge to the Canadian state is how to reverse rigidities and restore flexibilities down the system, while protecting flexibility in the business

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<sup>110</sup> Gigi Berardi et al., "Stability, Sustainability and catastrophe," 121.

<sup>111</sup> For example, in the agriculture industry, large-scale producers in Canada have adapted to consumer demand for soy based products by drastically expanding production of soy beans over the past 20 years. Canada, Statistics Canada, "The soy bean, agriculture's jack of all-trades, is gaining ground across Canada," Ottawa: Government of Canada. <http://www.statcan.gc.ca/pub/96-325-x/2007000/article/10369-eng.htm>

<sup>112</sup> Ommer, *Coasts Under Stress*, 441.

world. In can be done – and it will be done more easily with restored ecosystems and with healthy, well-educated people living in well-networked, multigenerational, diversified communities spread throughout the country.<sup>113</sup>

One example of this reversal is a return to household food production using locally produced food. In the past, growing vegetables and herbs, canning food, drying food, cooking and hunting were commonplace. Yet today the majority of society relies on large grocery chains, pre-packaged food and take-out restaurants. The collective knowledge that allowed for greater flexibility on a basic, local, or household level has been lost:

Businesses have now built flexibility into their operations as a response to globalization. This could be good, but not if they achieve flexibility (as they have done) by passing rigidities down the system to the ground floor. Multi-tasking (which used to be a rural-community strength) is now required of industrial work forces and, combined with piece work, leaves people waiting for a call to work, and unable to become involved in other employment, to take just once example.<sup>114</sup>

Ommer does not imply that this is a zero-sum game; instead, her research suggests that flexibility is strongest when “all levels of the state meta-system” are supported and contributing to the broader goal of flexibility, productivity and resilience.<sup>115</sup> Agriculture, like fisheries, has moved away from traditional practices towards intensive and large-scale production, corporate ownership, and environmentally unsustainable modes of production.<sup>116</sup>

### **Information Networks**

Another important characteristic of a flexible system is strong information sharing networks. This allows new ideas, whether on policy change or farming techniques, to exchange quickly and easily. Ommer’s research suggests that a silo-based approach to policy making reduced the ability of policy makers and politicians to mitigate ecosystem destruction in the fishing industry:

Our work... has shown that policy making and industry practices have been silo-based (constructed within the walls of one department or company, without reference to impacts in other parts of the system) and

<sup>113</sup> Ommer, *Coasts Under Stress*, 440.

<sup>114</sup> Ommer, *Coasts Under Stress*, 441.

<sup>115</sup> Ommer, *Coasts Under Stress*, 439.

<sup>116</sup> Weis, *The Accelerating Biophysical Contradictions of Industrial Capitalist Agriculture*, 314-341.

not very skilful at listening to the needs or to the knowledge of the grass-roots levels of the Canadian citizenry. Ecosystems, however, work at multiple levels, and the result of this social-ecological scale misalignment and silo-based approach has been to exacerbate lack of awareness of impending crises...<sup>117</sup>

There are many ways to improve the flow of information in the agriculture community in aid of flexibility. This cannot happen solely at the policy level, as policy makers and politicians are often constrained (e.g. by fiscal constraints) to quickly act on research presented by the scientific community, as currently seen with stalling by federal and provincial governments to enact meaningful climate policy.

Information sharing to create flexibility can be expanded between established farmers, between experienced and new farmers, within a local food system (e.g. farm market organizers sharing ideas), and between farmers and consumers. For example, diversified information networks can help distribute local information on farming techniques to help adapt to extreme weather. Such techniques include digging dykes, planting drought resistance varieties, pest management techniques, or processing damaged crops. Similarly, better networks between farmers and consumers can help educated consumers on the importance of eating seasonal goods, or goods that have been affected by pest or extreme weather (e.g. bruised fruit).

The interviews illustrated how small-scale production and local food systems strengthen agricultural information networks and help diversify food knowledge. For example, four of the sixteen farmers interviewed taught agriculture courses to local elementary schools or colleges. Farmer #10 on Vancouver Island volunteered at a local elementary school three blocks from the farm, in addition to hosting numerous community groups, academics, and citizens:

We are working with a new school that just opened down the road. It just opened this year, and is based on the Waldorf/Montessori model. And they asked us if we could be a part of their education. So we had all the kids here at the farm, and then I went and helped them plant their gardens. And tomorrow we have a Cub Scout group coming. So, we're beginning to see more parents who want to bring their kids, and we see it at the market too. It

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<sup>117</sup> Ommer, *Coasts Under Stress*, 433.

seems like it skipped a generation, but it's your [the author's] generation who want to be the change, and change the way they eat.

Although the benefits that result from this shared knowledge are hard to quantify, these connections help diversify agricultural knowledge in a community, connect farmers and consumers, and help present farming as a viable career option for new farmers.

Most farmers interviewed who participated in community farm markets expressed the desire to share agricultural knowledge. Farm markets help establish personal connections between growers and consumers, and gave these farmers the opportunity to talk about how food was grown, to explain visual inconsistencies in products (e.g. pest marks) and to educate consumers on how to cook or preserve certain products. Farmer #16 stressed the positive impact of farm-market culture on her business:

Through working farmers markets with my own business, I started to meet more and more young farmers. There are so many young farmers here and we all kind of know one another, but working at the markets we really got to become friends. I met *[name removed]* at one particular farmers market and become friends, and he came to me and suggested I take over his lease at Haliburton. He had built up this plot for many years and wanted someone with similar values to take it over. He helped me put the proposal together for the land. So this year I will keep my old ¼ plot, and the 1 acre plot here. Meeting people and making relationships is how I've gained all my knowledge. Farmers from all around the area just donated tools and supplies to me because they know how hard it is to get started.

The young family at Farm #5, who sold most products directly from the farm in the South Okanagan, also shared this sentiment. Their farm business was built on the concept of growing and selling heritage seed varieties to local residents so they could grow their own crops:

We have an open door policy, so if you want to check out where your food comes from, then good for you, because that's what you should do, and that's what we want people to do. We want people to come here to see what the plants look like; then we want people to get into the seeds, which we have for sale; then we can also teach about preservation, and how to store your food.

Often, this level of information on food production and preparation is unavailable from larger food retailers, where employees may not know where or how food was produced, or may not have the time to share ideas on preparation or processing.

The interviews also revealed a number of innovative ways in which production knowledge is being transferred between farmers in local food systems. As farming is a complex and multi-dimensional business, it is vital to foster new networks to allow farmers to help one another increase production and respond to external problems. For example, Farmers #15 and #16 farmed one-acre plots at Haliburton Farms in Saanich. Haliburton Farms is owned by the municipal government and provides 10 lease lots. It includes an old home that is used for processing and cleaning and as a warm space for farmers. Both farmers stressed that this communal gathering place was vital to the exchange of ideas between the ten farmers at Haliburton, and played a big role in Haliburton's success as a pillar of the local food system. Farmer #15 explained:

There is a building that looks like a house that is very important for us. It gives us a space to teach classes and do presentations. In the winter it gives us a warm space where we can all have lunch. It just a space for communal sharing. In the growing season we have a full meeting once a week, and we connect over lunch in-between this. Whenever anybody has a question, it's so nice to walk over to the next growing area and see what people do there and ask questions. It can be very lonely when you start up and there is nobody around for moral support and help with farming questions.

Similarly, Farmers #9 and #10 on Vancouver Island were heavily involved in the design and construction of a year-round indoor market for local growers to sell their products:

I'm not ever going to use the word 'farmer's market building,' it's always a 'place for agriculture,' because it's way more than that [a farmer's market], especially for education purposes. We do two courses here on farming, and I teach at the college, an organic gardening course. It's twelve weeks long, and it's always full. So if we could run these courses out of a center, we can be training backyard gardeners to grow their own stuff.

Popular farm markets like the ones in the Comox-Valley provide a valuable outlet to support local agriculture, and to transfer agricultural knowledge to other producers and consumers. Local knowledge is particularly important for farmers and consumers as it can help them understand and prepare for unique regional climate changes, pest, and weather problems caused by global climate change.

### **Diversity and Flexibility in Small Scale Agriculture and Local Food Systems**

My visits to small-scale farms in B.C. helped confirm that small-scale agriculture and strong, interconnected local food economies offer one method of enhancing diversity and flexibility in British Columbia. All sixteen of the small farms visited, with the exception of two apple-only farmers, practiced extensive poly-culture methods. Most of the farms sold their products through multiple distribution networks, including home consumption, direct sales, farm markets, food boxes and local and non-local retailers. For example, Farmer #3 (two brothers) ran an eight-acre, certified organic farm in the South Okanagan. To avoid the drastic price swings in the tree-fruit industry that plagued their apple farm for ten years, the brothers now grow a large variety of ground crops, organic peaches and cherries, and raise animals such as ducks and pigs. Their products are sold at farm markets throughout the Okanagan Valley. They had made extensive efforts to grow products they could sell in the early spring, late fall and winter months to help stabilize income.

A host of academic research also suggests that local food systems and small-scale agriculture are associated with the strong community-oriented values that Ommer (above) associates with flexibility. Berardi et al. confirm this association: “the innovative nature of small farms can be seen in their disproportionately high enrolment in conservation programs and in crop diversification strategies. Further, smaller producers are at times better suited to respond quickly to market needs, thus adapting supply to demand.”<sup>118</sup> Other, more measurable attributes of local food systems closely resemble the qualities Ommer associates with flexibility, such as “the creation of vibrant green spaces, revitalized brownfield sites, improved air quality, food that travels a shorter distance from field to plate, preservation of cultivable land, cooler buildings, and improved urban biodiversity.”<sup>119</sup> Ommer argues that strong local communities, featuring healthy ecosystems, are the bedrock of a resilient and flexibly fishing economy (and complement the flexibility associated with corporate production). As described above, small-scale

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<sup>118</sup> Gigi Berardi et al., “Stability, Sustainability and catastrophe: Applying resilience thinking to U.S. Agriculture,” *Research in Human Ecology Review* 18, no. 2, (2011): 121.

<sup>119</sup> Wendy Mendes et al., “Using Land Inventories to plan for Urban Agriculture: Experiences from Portland and Vancouver,” *Journal of the American Planning Association* 74, no. 4 (2008): 436.

agriculture and local-food systems provide similar environmental services, and can therefore help expand the level of flexibility in a food system.

In absence of comprehensive research on the resilience of food systems, this chapter has outlined a set of principles derived from the broader resilience literature. The first section of this chapter used the influential work of C.S. Holling and Thomas Homer-Dixon to show that resilience can be enhanced by strengthening internal strength, including strong domestic agricultural production. As B.C. only produces 48% of its domestic food requirements, provincial production should be increased to enhance resilience. The latter half of this chapter outlined how diversity and flexibility can help enhance the resilience of a system, with results from my farmer interviews reinforcing key points. In particular, Lin's research shows how diversity increases the redundancy in a system so that failures in one area are mitigated by strength in other areas. Ommer's research suggests that flexibility can be increased by capitalizing on the unique adaptive capacities of different scales of actors in a system. In particular, Ommer shows that strong local communities and ecosystems are the bedrock of a flexible system, and can complement the productivity of large-scale production. Ommer also stresses strong information networks to help actors respond to problems and share new ideas.

The following chapter will explore a set of policy proposals and new programs that can help expand small-scale agriculture and strengthen local-food systems in B.C. As explained in the introduction, small-scale production and local-food systems can help increase domestic production on B.C.'s limited remaining farmland. Furthermore, small-scale production and local food systems offer the type of diversity and flexibility required to build redundancy into the food system, as both the academic research and my interviews reveal. The policy ideas discussed in the following chapter draw primarily on ideas gathered from the interviews, and reflect the types of policy required to establish new farms, increase local production and shift to local consumption.

## **Chapter 5 – Towards a More Resilient Food System: Policy Priorities**

This chapter sets out potential policy reforms and program ideas that could support the goal of a more resilient agricultural system in B.C. As mentioned in the introduction, this analysis emphasizes support for small-scale agriculture and local food economies. B.C.'s food system, like other industries, is strongly shaped by government regulations and policies. Consequently, reforming this system to prepare for climate problems will likely require wide-ranging guidance and support from multiple levels of government. It is unlikely that the free market alone can push B.C.'s food system to the level of resilience required, especially if farm land is not protected, or if policies continue to support industrial agriculture and hinder low-emission and resilient alternatives.

At the same time, policy research is only one step towards plausible policy proposals. The following chapter grapples with the practical obstacles to such reforms under current and foreseeable conditions in the province. Those sources of resistance are crucial strategic conditions that qualify or alter what is possible. The current chapter will also not discuss the predicted impact of each policy option: my intent is to highlight the policies that B.C. farmers believe are beneficial for small-scale agriculture and local-food systems, and areas where farmers feel they need further assistance.

The ideas explored in this chapter are informed primarily from the sixteen farmer interviews. In some cases, the ideas from the interviews are supplemented with secondary research on potential policy solutions. For example, many farmers mentioned the importance of farmland preservation, but few were aware of the recent Auditor-General report on the ALR that presented a number of strong policy options to achieve this goal.

The ideas garnered from my research fell readily into four distinct policy areas to enhance resilience: farm land preservation; support for small-scale producers; shifting consumption habits; and farmer training/education. Without adequate farmland, especially in populated urban regions, it will not be possible to achieve the production levels necessary to build resilience. Without productive and successful small farms and educated farmers, B.C.'s limited farmland will not be fully utilized. Without consumer support, efforts to increase local production and consumption will be far more difficult.

Many other requirements of a secure food system are not discussed in this thesis. These include policies to help reduce agricultural GHG emissions, support for medium and large-scale agriculture, resolving safety issues with genetically modified crops, and food affordability issues.

### **Farm Land Preservation and Access**

Quality farmland is the most essential aspect of a resilient food system in British Columbia. Farmland preservation and access was undoubtedly the most pressing issue farmers discussed in my interviews, especially among younger farmers who were constrained by high land costs and limited lease opportunities. Recent increases in property values in B.C., particularly in the three largest agricultural regions, have made the economics of purchasing farmland very difficult. Several farmers highlighted this financial challenge. For example, Farmers #2, #3, #4 and #7 all farmed on family-owned land, and noted that they would not be farming without family access. Farmer #4 stated:

What young person is going to find a million dollars to go to the bank, and what bank will even lend it to them? Agriculture is a very volatile industry. The reason I'm able to do what I do, is 'cause my dad owns the land, and he isn't going to depend on it to retire, and he asked me to run it. I would absolutely not be farming without my family land. In the future, young farmers are not going to own land. They will be leasing land from people who own it. This is unfortunate. There are also problems with leasing; the owner can sell the land or jack your rent, and you do not benefit from all the value you added to the land through your labour.

One partner at Farm #7 shared a similar experience with high land prices:

We're farming on this piece of property that is owned by our great uncle, and also partially owned by our father and his siblings. Being able to farm on family land creates a low risk option for us. This means we are able to grow and learn as young farmers in a supportive environment. As young farmers without a lot of equity or capital to purchase something, this land means that right now our farming is viable. But, the thing with us is we don't even have a lot of land security. The land is located in the middle of Surrey so land value and development pressure is a major barrier. The market value of this property is ridiculous, and it's owned by multiple family members, so we don't know. This [selling family land because of multiple owners] is a very common theme with family land. It's not that the family doesn't support our farming, it just makes it more complicated and uncertain.

The high cost of farmland in B.C. demands new ways to preserve this land (both for the land's sake and so that prices on remaining land are not pushed higher), and to help farmers access it. In the most difficult early years of farming, new farmers must learn a variety of skills, and many cannot make enough profit during this time to continue. My discussions with newer farmers, such as Farmers #6, #7, #14, and #16, made it clear that aside from clearing land, the other start-up requirements for small-scale farming were minimal; therefore, easier access to land for aspiring farmers could lead to rapid increases in local production. Ideally, B.C. should maintain an over-supply of farmland for production, to prepare for a significant climate threat that limits the availability of imports or drastically increases prices. This availability will provide greater flexibility to expand or contract production when necessary.

### *Reforming the Agriculture Land Reserve*

For the past forty years, British Columbia has been considered a world leader in farmland preservation. In 1974, British Columbia implemented a farm zoning restriction called the Agriculture Land Reserve (ALR). This immediately restricted development on approximately 4.7 million hectares, or about five percent, of land across the entire province. While the Agricultural Land Commission (the body responsible for administering the ALR) has been relatively successful at protecting this land (139,000 hectares of 4.7 million have been removed, or .003%, as of 2000), development pressure remains high.<sup>120</sup> Most of this excluded land was “prime land” and was lost to urban expansion and development, which is a significant setback to the production capacity of B.C.'s most populated regions.<sup>121</sup> Despite development pressure, the ALC and ALR are broadly supported organizations,<sup>122</sup> and offer a unique mechanism for dealing with land preservation and affordability issues in B.C.

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<sup>120</sup> British Columbia. Agricultural Land Commission. “Table 1: Area Included and Excluded from the ALR by Year, in hectares - 1974-2000.” Victoria, B.C.: Government of British Columbia, 2013. [http://www.alc.gov.bc.ca/alr/stats/Table1\\_incl-excl\\_allyears\\_d.pdf](http://www.alc.gov.bc.ca/alr/stats/Table1_incl-excl_allyears_d.pdf)

<sup>121</sup> British Columbia. Office of the Auditor General. *Audit of the Agricultural Land Commission*. Victoria, B.C.: Government of British Columbia, 2010. [http://www.alc.gov.bc.ca/publications/OAGBC\\_AgriculturalLandCommission\\_Final\[1\].pdf](http://www.alc.gov.bc.ca/publications/OAGBC_AgriculturalLandCommission_Final[1].pdf)

<sup>122</sup> Numerous opinion polls have shown broad support for protecting agricultural land in British Columbia. For example, Barry Smith states “an opinion survey in 1997 found that over 80% of British Columbians considered it to be unacceptable to remove land from the ALR for urban uses.” Smith, “*A Work In Progress*,” 25.

Although the ALR protects a large amount of farmland, discussions about farmland in B.C. are often skewed by the large quantity of unirrigated and low-quality lands in central and northern B.C. Of the total land protected by the Agricultural Land Reserve (discussed below), 50% is located in Northern BC, 31% in arid Central BC, and 8% in the Kootenay region.<sup>123</sup> The remaining 11% is divided between the densely populated Okanagan Valley, Vancouver Island and Vancouver/Fraser Valley region. While farmland in Central and Northern B.C. will likely play a key role in B.C.'s future agriculture system, especially if irrigation is improved, this policy review will focus primarily on land preservation in the three smaller regions. As most large land parcels in these productive regions are already utilized for agriculture, the remaining unused land parcels are both the ideal targets for urban expansion and the perfect location for expanding small-scale agriculture.

Efforts to reform and strengthen the ALC and ALR are not new. Since their inception, farmland advocates have collaborated to improve their effectiveness, and there are many strong policy ideas on how B.C. can strengthen the ALR and protect farmland. One particularly valuable analysis on fixing the ALC comes from a comprehensive review of this body by B.C.'s Auditor General in 2010. The A.G.'s review of the ALC/ALR highlights the many challenges that confront the organization, and policy options that can address problems within the ALC. The summary confirmed that the ALC does not have the tools required to effectively achieve its mandate.<sup>124</sup> In particular, the report found:

- The ALC is challenged to effectively preserve agriculture land and encourage farming in British Columbia;
- The ALC is not adequately protecting ALR land from damage through its compliance and enforcement activities; and

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A 2014 study by the Vancouver Foundation and the Real Estate Foundation of B.C. found that 73% of British Columbians agree or agree strongly that the ALR is essential in protecting food security in B.C. Emma Crawford Hampel, "British Columbians Show Strong Support for ALR," *Business Vancouver*, September 18, 2014. <http://www.biv.com/article/2014/9/british-columbians-show-strong-support-alr/>

<sup>123</sup> British Columbia. Agricultural Land Commission. "Agriculture Stats by Region." Victoria, B.C.: Government of British Columbia. [http://www.alc.gov.bc.ca/alr/stats/Perc\\_ALR\\_by\\_Region.htm](http://www.alc.gov.bc.ca/alr/stats/Perc_ALR_by_Region.htm) (Accessed March 2nd, 2013).

<sup>124</sup> *Audit of the Agricultural Land Commission*, 5.

- The ALC is not adequately evaluating and reporting on its findings

For example, the audit confirmed that the ALC does not have a modern land mapping system in place and they often rely on original tattered paper maps from the 1970s. A modernized mapping system could provide better data on land availability to help inform future land use decisions and policy direction, and help locate non-protected land that could be brought into the ALR. The A.G.'s review also criticized the ALC's practice of reviewing all land-removal applications, even if the application is for "prime land". This time-consuming work, especially on applications that are certain to be rejected, distracts the ALC's small staff from challenging application cases: accordingly, "one suggested change is restricting or prohibiting applications to remove ALR lands that have prime agriculture capability."<sup>125</sup>

The report also revealed problems caused by the ALC's very small 2011/2012 \$1.9 million dollar budget, in particular the poor compliance monitoring: "The compliance and enforcement team focuses the majority of its efforts on ALR lands in the Lower Mainland and South Coast Panel region. The commission told us it cannot address enforcement issues elsewhere on a regular basis without additional resources."<sup>126</sup> The Auditor General suggests better enforcement tools such as the ability to obtain evidence directly (currently, they must request it), the ability to issue tickets or fines, and the ability to encumber a property title if a fine is unpaid or an order is unfulfilled.

Altogether, the 2010 Auditor General report suggests nine actions that the provincial government should implement to help the ALC achieve its mandate of preserving land and encouraging farming. These clear recommendations offer valuable methods to preserve land and strengthen the ALC. The Auditor General's strong understanding of realistic policy options (e.g. within current budget constraints) makes these recommendations even more realistic. Furthermore, a government sympathetic to the ALR's mandate could use the Auditor General's position as a neutral third party that works in the public's interest to lend credibility to reform efforts.

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<sup>125</sup> *Audit of the Agricultural Land Commission*, 11.

<sup>126</sup> *Audit of the Agricultural Land Commission*, 11.

For this thesis, three participants farmed land not protected by the ALR. These parcels, located in the prime agriculture regions of central Vancouver Island and the South Okanagan, were very hospitable to agriculture. The land was left out of the ALR because the parcels were too small or were classified as “mixed soil” land, meaning the land was made up of different patches of soil, rock, clay and water. For example, the husband and wife at Farm #10 operated a successful 4-acre polyculture farm on non-ALR land. Ironically, the mixed soil landscape actually benefited the owners, as it allowed them to grow different types of crops, and keep some land in its natural habitat to improve biodiversity: “You could not have a big field here. Some places are gravel, and some places have great soil. We know where we have soil we can work with, and where other places are too swampy.” The landowners stated they would be willing to bring the land into the ALR for a small bonus of cash, property tax reductions, or additional land; others may do so simply knowing that the land will be used for farming in perpetuity. The ALC should explore opportunities to bring new land of this kind into the ALR through cash payments or other incentives.

Reforming and strengthening the ALC can limit conversions of B.C. farmland. Although this protection is vital, this does not automatically mean more land will become available for farming, nor will it necessarily lead to a greater availability of small-plot land leases for new farmers. In addition to ALR protection, new ways should be developed to link new farmers to unused land, and make more ALR and non-ALR land accessible to farming.

#### *Municipal Governments and Land-use Zoning*

Within urban regions, municipal governments play an important policy role in creating space for agriculture. Municipalities have a strong understanding of urban land inventories; are responsible for regional agricultural issues such as water availability, property taxation, building regulations, farm-market locations; and may have a better understanding of local support for agricultural advocacy. Progress at the municipal level is particularly important as individual municipalities can act as a laboratory for certain policies before they are implemented on a wider scale. Furthermore, municipalities control urban land suitable for agriculture, such as city parks, green spaces, boulevards

and beltways. Although this land is also valuable for recreation, some of this land could likely be used for community gardens or to support farm businesses.

For example, municipal voters in the mid 2000s mandated the City of Vancouver to expand urban food production drastically, and the city has since implemented a multi-pronged agricultural strategy.<sup>127</sup> Vancouver's strategy focuses on five goals (increase production, connect residents with local food networks, improve retail access to local food, increase processing and distribution, and reduce food waste) and multiple policies to achieve these goals. Farmer #8 was heavily involved in Vancouver's agriculture expansion. Their business farmed on moveable containers on a series of four unused parcels (totalling 4.5 acres) that included two contaminated gas station sites, a property slated for future development and a municipal plot. As everything was done in containers on forklift pads, they could easily move each farm to a location if necessary. The City of Vancouver was very supportive of this particular farm business, and the model of container gardening could easily be expanded to other regions. The Province helped promote this type of farming by providing research and guidelines to other local governments on finding unused lands for the purpose, and how to structure land-lease contracts with farmer.

Another example of municipal-level innovation is Haliburton Farms in the municipality of Saanich. Haliburton is a nine-acre farm that is divided into seven individual, one-acre lease plots. The annual cost for a plot is very low, and demand is high. Prior to 2004, this property had not been used as a farm for 30 years; it is now one of fourteen community-owned farms in Canada. Establishing Haliburton Farms was complex (obtaining land and zoning), but after ten years of operation, it is a model for other municipalities looking to create small-scale lease plots.

Farmer #15 was one of the first farmers at Haliburton in 2004, and highlighted the importance of establishing permanent spaces for agriculture:

There was nothing when I started – fencing and irrigation had to be installed, and the land had to be cleared. It was very challenging. It is much easier now for new farmers because the infrastructure is in place.

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<sup>127</sup> City of Vancouver, "What Feeds Us: Vancouver Food Strategy," January 2013. <http://vancouver.ca/files/cov/vancouver-food-strategy-final.PDF> (Accessed October 14, 2014).

every farm has fencing and irrigation, and greenhouses. Those were put up on the farming business themselves. Sometimes they take them, or they sell them to the next farmer taking over the land. Some green houses are permanent and can be used by new farmers.

The Province could assist local governments by establishing guidelines for setting up similar farms (such as information on governance structures, outlining criteria for choosing farmers, setting financial targets, or providing ongoing support to help deal with problems), and could provide grant money for obtaining land for this purpose.

For example, the two brothers at Farm #3 operated a piece of family-owned land within the municipal boundaries of their community, surrounded by new housing developments. Although financial pressures to sell were high, they wanted their land used for farming indefinitely, and believed this land would be perfect for the municipality to purchase for community agriculture:

Our farm should be a community farm. This orchard would be perfect for school programs, community gardens. There could be classes in the high school on value added products. If this land is in the community, it could use a democratic process to run the farm. It could be so easy. Farms could be in a regional district plan, and governments should then be required to put money away to purchase community farms. We have to have a long term vision of agriculture. Say a 200 year plan. Community farms will be vitally important in the future.

Despite the numerous benefits of municipally-owned farm land, such as the increased availability of low-cost lease land, increased agricultural diversity, and improved agricultural education opportunities, the costs associated with such acquisitions are significant, and numerous administrative issues may arise as a result of a community-run organization (e.g., conflicts within the board of advisors, or problems selecting farmers to lease land).

A number of the younger farmers interviewed could clearly have benefited from a farm like Haliburton in their area. For example, the couple at Farm #14 was leasing a home and small plot of land from a private landowner, but stressed his desire for a larger plot of established land close to similar farms, to capitalize on shared selling power and better community:

We need more space, but farmland owners don't want to lease small lots, they want to lease 50 acres. The municipality could purchase 50 acres and divide it

into 1 or 2 acre plots with roads, water and fencing, and rent it for \$3000 per year. If you lease land, and infrastructure is in place, you are pretty well set, but if you have to purchase the land, and the equipment needed, you are talking hundreds of thousands of dollars for that sort of asset acquisition. We'd love a location close to other farmers so we could pool our resources and sell food to larger retailers or care homes or hospitals.

There are numerous benefits to government-owned lease plots, including reduced pressure to increase rent (rent at Haliburton was \$500 per year for approximately one acre), sell land, or arbitrarily end the lease. By contrast, a private home owner can end a lease of residential property if a family member moves back in.

Little research examines the number of new or experienced farmers in B.C. who would be willing to use government-owned lease plots, or how costly it might be for local governments or the Province to develop lease plots. The Ministry of Agriculture could work with research institutions or the Union of British Columbia Municipalities (UBCM) to research the costs of developing municipally-owned farmland, and could create guidelines on effective farm development and administration.

### *Zoning Issues*

Deborah Curran is an important voice in municipal land use and preservation issues. Her work focuses on growth management, land-use law, food systems and agriculture land. In a 2010 paper on farming in Metro Vancouver, Curran presents a range of policy solutions to protect and develop urban farmland. Curran focuses largely on local governments, where many of the zoning restrictions and land-use applications are made. Curran also reinforces the importance of land-use planning in urban regions like Vancouver: "Metro Vancouver is part of less than 1.5% of the B.C. land base that generates 28% of the farm gate receipts and also where 52% of the population resides."<sup>128</sup> This land is vital to a resilient farm economy, yet the pressures of development are significant.

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<sup>128</sup> Deb Curran, "Local Government Policy Options to Protect Agriculture Land and Improve the Viability of Farming in Metro Vancouver," Paper prepared for Metro Vancouver, Vancouver, B.C., 2010, 1. [http://www.metrovancouver.org/planning/development/agriculture/AgricultureDocs/Local\\_Government\\_Policy\\_Options\\_to\\_Protect\\_Agricultural\\_Land.pdf](http://www.metrovancouver.org/planning/development/agriculture/AgricultureDocs/Local_Government_Policy_Options_to_Protect_Agricultural_Land.pdf)

Curran provides nine creative policy solutions for local governments to protect and develop farmland and farming in urban regions. This review will briefly review the recommendations that relate to land protection before exploring two of the most promising policy options:

1) Implement greater “regional and edge planning” by establishing better agriculture boundaries around ALR land, which can decrease some of the speculative land value attributed to farmland due to the possibility of excluding it from the ALR.

2) Establish “agricultural enterprise zones” to facilitate the co-location of agriculture services in a certain spatial area to benefit both the farms, food producers and the businesses.

3) Create an “amenity bonus” program to transfer development rights from properties with agricultural values to another property that is more suitable for land development or commercial use.

4) Establish a regional agriculture fund, based on annual property tax, levies, or other fiscal mechanisms, to carry out a variety of farmland and ecological conservation activities. The fund can be used to acquire “no-subdivide” and other pro-agriculture covenants on land, purchase farm land then resell it at below market value with covenants that the land will be resold below value in perpetuity, purchase agriculture land that can be leased to new farmers, and support agriculture programs.

5) Create a Regional Farmland Trust to supplement the land protection efforts of the ALC. A municipal trust could play a more assertive role in purchasing lands, applying covenants, and partnering with non-governmental land trusts to combine public funds with private donations. The City of Richmond provides a successful example of this; the city now owns 286 acres of agricultural land, both inside and outside the ALR. Richmond is now entering into a partnership with Kwantlen Polytechnic University’s “Richmond Farm School” to farm and manage the land for educational purposes.

6) Support an “agriculture development office” that can hire staff to assist farmers with different agriculture activities ranging from business planning to cropping practices. Extension agents can help coordinate access to farmland, identify Crown and local

government land for farm use, facilitate agricultural enterprise zones, and facilitate amenity bonuses.

7) Compensate farmers for “alternative land use services,” which are the services farmland provides to a community through agriculture activity such as rainwater management, wildlife and fish habitat, protection of biodiversity and tourism. This program could provide payment to farmers for growing certain crops, leaving environmentally sensitive areas fallow, or simply for the ecological services the land provides.

While Curran recommends numerous methods of preserving land and encouraging farming in B.C., the financial obligations associated with some of these ideas will make them difficult to implement (#4, #5, #6, #7). Voters opposed to heavy taxation may reject increased property taxes and additional levies required to fund such programs. Although some financial obligations are associated with amenity or density bonuses, these policies offer a subtler and more effective method of supporting land preservation and ‘smart’ development, as they are often implemented on a case-by-case basis, are based on local needs and may not require extensive funding.

Amenity bonuses can take many forms. For example, a municipality could facilitate the exchange of prime agriculture land for another land parcel better suited to commercial development, or could offer incentives to land owners to protect arable land on development properties in exchange for building-code easements. Similarly, a municipality could pay a developer to reduce the size of a condominium development to allow for a community garden on the site, or could allow the developer to build additional stories in exchange for garden space. Curran lists four common uses for these bonuses: 1) to ensure residential developments include urban or rooftop gardens; 2) to change bylaws to ensure proper use of farmland; 3) to purchase farmland to be held in a farmland trust and require that it is farmed; and 4) to maintain an inventory of land available for purchase in high density areas.<sup>129</sup> The provincial government can assist municipalities by providing dedicated funding to encourage developments that support agriculture.

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<sup>129</sup> Curran, “Local Government Policy Options,” 39.

The City of Vancouver has experienced significant success in encouraging food production by using municipal lands and amenity bonuses. For example, as of 2013, the city had 97 community gardens and 3900 garden plots for residents. Although city approval is a condition of all community gardens, the city has worked with the non-profit garden-management groups to secure tenure for gardeners, manage land-lease agreements, and amend zoning for new garden development.<sup>130</sup>

Another successful example of progressive municipal zoning rules comes from Washington, DC's Food Production and Urban Gardening Program, implemented in 1984. This program is designed make better and more systematic use of the district's empty lots and vacant land. The program stipulated that an "inventory should be created and regularly updated, categorizing the location and size of unused lots, and that those lots should be made available to the community for growing foods."<sup>131</sup> Such programs could support farmers like Farmer #8 by creating temporary spaces for agriculture. A local government could offer property tax reductions for landowners who provide such space.

#### *Other Farmland Policy Options*

Farmland is highly desirable for landowners and investors, particularly because it can offer features of an idyllic rural experience (as with hobby farms) close to major urban areas, and a fairly secure long-term investment. Often, landowners have no intention of using their land for agriculture, although some may engage in limited farming for the significant agricultural tax breaks. Policy makers should explore new ways to connect farmers with such landowners. Governments can help this process in numerous ways, such as template lease agreements, legal protection for lessees (similar to residential rental laws), or updated property taxation rules to encourage farming. Although few government services currently facilitate these relationships, advocacy organizations like FarmFolk/CityFolk and The Land Conservancy provide template lease agreements and information guides for lessees.<sup>132</sup> Connecting new farmers with

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<sup>130</sup> City of Vancouver, *What Feeds Us: Vancouver Food Strategy*, (2013).  
<http://vancouver.ca/files/cov/vancouver-food-strategy-final.PDF>

<sup>131</sup> Sarah G. Rich, *Urban Farms*, (New York: Abrams Publishing, 2012), 79.

<sup>132</sup> Wanda Gorsuch, "A guide to farmland access agreements: Leases, Profits A Prendre," report prepared for The Land Conservancy of British Columbia and FarmFolk/CityFolk, April 2009.

landowners offers a relatively simple, low-cost option for creating new farms. Policies aimed to encourage these relationships are not constrained by the financial barriers that limited many other agriculture policies.

For example, Farmer #16 had used the above-noted lease agreement to lease land from an older landowner who was happy to exchange her large yard for produce:

She was very committed to food security, so she didn't even charge me rent. We drew up a land lease contract to protect against any issues. None of my farming would have been possible without her support. Overall, the baby-boomer generation has the land and capital to help out. I would like to see more incentives for private individuals to make their land available to farmers. One of her incentives was that if I grew enough food she could apply for farm taxes and her property taxes could be dropped.

Hobby farms exemplify land that is underutilized for agriculture, and used instead for residency or investment alone. Although some hobby farms are used for subsistence or small-scale agriculture, Stobbe et al. suggest that the desirability of large-lot hobby farms for residential purposes “may raise farmland prices, making it more difficult for conventional farmers to expand their operations to achieve economies of scale.”<sup>133</sup> Stobbe notes that favourable property tax rates encourage individuals to purchase hobby farms as “sprawling large lot residential developments.”<sup>134</sup>

Using property tax definition of “hobby farm”(less than \$10,000 in farm receipts) provincially, 47.7% of farms qualify.<sup>135</sup> For example, a seven-acre farm in the Kelowna region only needs to sell \$2500 worth of goods to receive such property tax reductions. A farm of this size could easily produce more food at capacity. One possible way to increase production on hobby farms in B.C. is taxation encouraging active farming on them. For example, a landowner could only receive property tax breaks if their land produced more than \$2000 per acre in farm receipts (easily achievable for intensive agriculture). Alternatively, an escalating tax rate on unused prime land could be used to pressure landowners to sell or lease land to active farmers. Property taxation incentives

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<sup>133</sup> Tracy Stobbe, Geerte Cotteleer, and G. Cornilius van Kooten, “Hobby Farms and Protection of Farmland in British Columbia,” paper for the Department of Economics at the University of Victoria, 2008, 401. <http://www.cjrs-rcsr.org/archives/32-3/stobbe-final.pdf>

<sup>134</sup> Stobbe, “Hobby Farms,” 408.

<sup>135</sup> Stobbe, “Hobby Farms,” 408.

are a complex subject and more research would be required to implement tax-based policies to encourage farming.

Foreign and absentee landowners may complicate local purchases or use of farmland. Although some foreign owners do farm, farmland acquisition by non-farmers can increase land prices and push locals or new farmers out of the market. Other provinces, including Saskatchewan and Manitoba, have foreign ownership legislation that British Columbia could emulate.<sup>136</sup> Dave Sands of the ALR Protection and Enhancement Committee suggests that the impact on land prices could be minimized by policies that force these owners to lease to active farmers. He notes that governments should implement mechanisms to create stability for land lessees on foreign-owned or investment lands.<sup>137</sup> As of 2015, Saskatchewan is exploring policies to limit farmland purchases by public pension plans and large investment firms to combat rising farmland purchases.<sup>138</sup> This policy has met resistance from investors, including the Canada Pension Plan Investment Board.

### **Policies to Support Small-Scale Agriculture**

Farmland availability is the bedrock of a resilient food system, but requires new and effective ways to bring this land into production. To increase resilience, British Columbia should increase provincial production quickly, and ensure policies are in place to help expand production as climate threats increase. The interview process highlighted two important policy areas to assist small and local food systems. First, many small-scale farmers are struggling to access a strong market base to sell their goods, a struggle that includes difficulty accessing retail locations and consumer antipathy for local food markets. Second, farmers require more agricultural infrastructure, equipment and access to information to help them compete with international food production. For example,

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<sup>136</sup>Saskatchewan, Farm Land Security Board, “An Overview of The Farm Ownership Portion of *The Saskatchewan Farm Security Act*,” Regina, Saskatchewan: Government of Saskatchewan, 2013. <http://www.farmland.gov.sk.ca/ownership/overview.shtml>

<sup>137</sup>Dave Sands, “Protecting the Agricultural Land Reserve: Our Floodlands Under Threat,” paper prepared for the ALR Protection and Enhancement Committee, 2005, 9. <http://www.smartgrowth.bc.ca/Portals/0/Downloads/ALR-PEC%20background%20document.pdf>

<sup>138</sup>Jacqueline Nelson, “Saskatchewan stops pension funds from buying farmland as prices rise, *The Globe and Mail*, April 13, 2015. , <http://www.theglobeandmail.com/report-on-business/saskatchewan-stops-pension-funds-from-buying-farmland-amid-rising-prices/article23904754/>

farmers need for deer fencing, water wells, greenhouses, storage and processing facilities, abattoirs, composting facilities, government extension agents, and insect-management programs. Many individual small-scale farmers cannot obtain these facilities and equipment independently.

### *Access to Markets*

A particularly common problem mentioned in the interviews was that small-scale farms and those reliant on local food economies had difficulty accessing a steady customer base for their products.<sup>139</sup> It is often challenging for small farms to integrate into the large-scale supply chain (e.g. supermarkets, distribution networks, and processing facilities) that supplies most British Columbians and export markets. The resurgence of farmer's markets, community-supported agriculture (CSA) programs (coordinating with small farms to deliver produce directly to homes or businesses) and local produce stores has helped this industry in the last ten years, but there is room for significant growth in local food sales. Far greater financial incentives for people to begin farming flow from easier access to the markets and customers.

Farm #10 was a husband and wife team that ran a four-acre, certified organic polyculture farm on Vancouver Island. They had been farming for 20 years. Their ability to grow successfully on a small land parcel with numerous soil types highlighted the potential for small-scale production in regions without large, open land parcels. They began farming when one partner left the fishing industry in the late 80s: overfishing had depleted stocks and few jobs remained. A government support program for ex-fishers was the catalyst he needed to begin farming. The couple bought property in their community because a large food retailer was advertising a program to purchase produce from local farmers. Unfortunately, once the retailer got its program running, it quickly found purchasing from multiple local farmers too difficult and the program was cancelled. For large retailers far prefer purchasing from one large distribution centre, delivering on time with consistent product quality. While this works for the store, it cuts out small farmers.

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<sup>139</sup> This was not mentioned as a problem for the Farmers #1 and #4, who produced a single crop that was sold to a distribution centre.

One partner at Farm #10 noted, “We decided we did not want to work with stores like this, who can’t give you the time of day. And no, we can’t give you 100 heads of lettuce that looks exactly the same.” As the diverse crops they produced could not be sold to local grocery stores, they began to attend a weekly farmer’s market. At the markets, they noted their ability to negotiate prices for subpar or bulk crops, explain visual inconsistencies in products, and exchange food for other services, all of which are difficult for larger retailers. While this farmer loved the community feel of the market, the timing and location of the weekly market had clearly not persuaded most local citizens to leave the supermarkets. Weekly farmers’ markets do not work for many families on busy schedules, and bad weather or heavy traffic often attract consumers to easier options, leaving small farmers with surplus crops. The week that this interview was completed, a 146,000 square foot Costco Wholesaler opened there, further pressuring farmers outside major supply chains.

The couple at Farm #5 in the South Okanagan also discussed the consumer access challenge. This young family farmed a seven-acre polyculture property that included a mobile chicken coop, cows, pigs, goats, turkeys, and approximately one acre of ground crops. Unfortunately, they found the local farmer’s market on Thursday afternoons was poorly located and poorly attended: “people like to walk by and look at our goods, and talk to us, but nobody is buying. They come for the experience but we need people to buy the food.” These farmers did not have luck at local supermarkets either: “we were selling zucchinis to the local super-market for 60 cents a pound on a weekly order, and then someone else came in at 40 cents a pound, and we were cut out of the picture, without even being told that they cancelled on us. We just looked at the shelf and it was full of cheaper product.” Small-scale producers like the couple at Farm #5, who produce a wide range of crops throughout the year, would benefit greatly from strong local demand for such products. As many small farmers cannot integrate with larger-supply chains, a strong farm-market culture contributes to this goal.

The two perspectives described above vary greatly from the experience of Farmer #15 and #16, who were integrated in a more established local food economy that utilized on-farm sales, a CSA program, and multiple local markets. For Farmer #15, selling her produce was not a problem at all:

I can't grow enough food to meet the demand. Farmers know each other so well, and businesses know farmers so well, that a buyer can call up one farmer and if they don't have it, the farmer will refer them to another farmer. At the Moss Street Market, I can sell everything I bring, it's a very special culture here. That said, I still can't integrate into big grocery chains. They really want to sell locally grown food, but when I go around, they can only buy from the bigger farms.

The successes highlighted above show that strong local food systems and local markets contribute greatly to the success of individual farms. The following section considers how governments can help make this possible.

### *Community Markets*

Despite the problems just noted, farmers' markets are among the easiest and most convenient methods of reaching customers. Although they take time to establish, regular markets can quickly become a community feature and consumers can plan their shopping around market days. Popular markets like the Granville Island market in Vancouver or the Moss Street market in Victoria highlight how well-planned, established markets can connect local growers to consumers. Farm markets also provide a number of other important services; some of these have already been mentioned, such as educating consumers about the benefits of local food, food preparation and storage, and building community between farmers and businesses.

The primary organization responsible for farm markets in British Columbia is the B.C. Farmers Market Association (BCAFM). Currently, they provide multiple services for both consumers and farmers/organizers. For consumers, they provide a market locator, recipes, local food guides, and administer the coupon program described below. For farmers/market organizers, they provide guides for starting, strengthening, and insuring a market.<sup>140</sup> The BCAFM organizes a regular newsletter, workshops, conferences and other educational events to help market organizers and farmers grow a market and deal with problems in governance structures or law. The BCAFM also has information and programs available for municipal governments to help support local farm markets.

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<sup>140</sup> B.C. Association of Farmers Markets, "Strengthening Farmers 'Markets'" <http://www.bcfarmersmarket.org/markets/strengthening-farmers-markets>, (Accessed February 15, 2015).

The BCAFM can work with the Province in numerous ways to support local food systems. For example, increased funding for the BCAFM could expand workshops, grants for promotional materials, advertising in print/radio/television, or coordinator hirings. A market coordinator would help markets deal with new features such as live music, liquor sales, food-truck vendors, and potential legal problems (e.g. what to do if a person gets injured at a market).

The BCAFM operates one particular program that should be expanded. In 2012, BC provided two million dollars to the BCAFM for a coupon program to attract seniors, single mothers and low-income families to the province's farm markets.<sup>141</sup> The Farmers Market Nutrition and Coupon Program (FMNCP) provided seniors with \$12 per week and families with \$15 for local food products. Farmers could then redeem the coupon for cash. The intent of the program is to encourage people to attend markets and purchase local foods, in hopes that they will continue to shop locally in the future. To participate in the program, participants "take part in a free nutrition and skills building program offered by community agencies that have partnered with each participating market. These programs teach participants how to incorporate farmer's market foods into their everyday diet."<sup>142</sup>

In 2013, the coupons applied to 34 markets around B.C, growing to 47 in 2014. This program has quickly expanded over the past three years, but there is massive room for further growth. It could easily be expanded to include new or young families, new immigrants or other targeted groups. BCAFM statistical and anecdotal evidence clearly shows the program provides a valuable service to B.C. families.<sup>143</sup> Their 2013 publication confirms that:

- 92% of coupons were redeemed in 2013, up from 86% in 2012,
- 90% of participants stated that Farmers' Market Coupons made local food more

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<sup>141</sup> B.C. Association of Farmer's Markets, "Nutrition Coupon Program," <http://www.bcfarmersmarket.org/resources/nutrition-coupon-program> (Accessed November 5, 2014).

<sup>142</sup> Glenda Luymes, "Farmers' market coupon program gets a boost," *The Province*, August 18, 2014. [http://blogs.theprovince.com/2014/08/18/news-farmers-market-coupon-program-gets-a-boost/#\\_\\_federated=1](http://blogs.theprovince.com/2014/08/18/news-farmers-market-coupon-program-gets-a-boost/#__federated=1)

<sup>143</sup> B.C. Association of Farmers' Market, "Farmers' Market Coupon – Program Results," [https://bcafm.files.wordpress.com/2014/02/program-results-\\_fmncp.pdf](https://bcafm.files.wordpress.com/2014/02/program-results-_fmncp.pdf)

accessible,

- In 2013, 642 farms redeemed \$359,559 in coupons,
- In 2013, an average of \$10,000 was spent at each market and participants spent an additional total of \$100,000 of their own money at markets

My interview with Farmer #16 confirmed this program benefits small-scale farmers:

The coupon program was great for me. I found that people with the coupons were ‘way more adventurous on what they would buy, because they aren’t so attached to the money. They would often buy really random or odd crops, and try new things. Selling these crops is great for farmers, because we grow more than just carrots and broccoli. It’s most seniors, low-income, and newcomers to Canada. The new immigrants are often familiar with other crops that most Canadians aren’t familiar with.

The past success of the coupon program shows that it could readily expand into new communities and new participants. This would require additional provincial funding or alternative funding models (e.g. municipal money, or Carbon Tax revenue).

The Province could also work with the BCAFM to help communities build farm market infrastructure, including permanent locations for local food systems. As previously mentioned, Farmer #9 was part of a local food advocacy coalition that was building a new community market to kick-start the local food economy: “This building can stimulate the economy, provide local education, and make our region and province more food-secure.” This coalition had been working for three years to build a large, community-owned “place for agriculture,” as previously discussed. The proposed market would be strictly for local agriculture. The coalition hoped to hire a coordinator that would sell produce during the week, and fill orders from local restaurants and grocery stores. Supermarkets would then place bigger orders from a single supplier. In addition, the market would offer agricultural courses and cooking courses. While small farms cannot compete with large chains on their own, together they may be able to offer competitive services.

Government support for community market infrastructure is a valuable way to help small-scale and local farmers access new customers. Some communities require small infrastructure improvements in community spaces, such as covered shelters,

washrooms, parking spaces, picnic benches, or centrally located land. Other, better prepared communities, such as Farmer #9's community, would benefit from funding for permanent, municipally owned public markets, or places to sell local food and other goods.

A farm-market grant program could be successfully administered within the Ministry of Agriculture. Such a program could require municipalities to submit detailed designs/plans and budget estimates before money is distributed. Alternatively, funding could encourage commercial developers (e.g. a new condominium or development) to build for temporary or permanent farm markets. The new Hudson development in Victoria has successfully built a popular food market that leases "day table" space to local farmers 6 days per week.<sup>144</sup> This allows farmers to sell goods on their own harvest schedule. As of 2014, the market is home to a butcher and a cheese producer, both of whom sell Vancouver Island-raised products. The Hudson Market received a start-up grant from the Vancouver City Credit Union to help with design and construction.<sup>145</sup>

#### *Community Supported Agriculture*

Lastly, alternative sales models could be greatly expanded, such as community supported agriculture (CSA) programs and local food box programs. CSA programs offer the opportunity to purchase a "share" of a farm's production at the beginning of the season in exchange for weekly food deliveries.<sup>146</sup> Local food box programs likewise provide a weekly food delivery, but the purchaser places a weekly order with a farm or organizer. The CSA model provides farmers with upfront funding to produce throughout the year, but also spreads the financial risk across multiple individuals, mitigating losses from a poor harvest. Such diversification of funding can add diversity and enhance farm resilience. CSA's allow farms to deliver goods to one

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<sup>144</sup> Victoria Public Market at the Hudson, "Become a Vendor," <http://victoriapublicmarket.com/vendors/become-a-vendor/> (Accessed November 5<sup>th</sup>, 2014).

<sup>145</sup> Vancouver City Credit Union, "2013 enviroFund Grant Recipients," <https://www.vancity.com/AboutVancity/InvestingInCommunities/Grants/enviroFund/2013grants/> (Accessed November 5<sup>th</sup>, 2014).

<sup>146</sup> "What Are Community Supported Agriculture Farms?" *David Suzuki Foundation*, <http://www.davidsuzuki.org/what-you-can-do/queen-of-green/faqs/food/what-are-community-supported-agriculture-farms/> (Accessed November 6, 2014).

location and guarantee a customer base. Three farmers interviewed noted that their CSA business was a valuable and steady way to get food to customers. Farmer #6 wanted to start a CSA business, but was hoping to find another farmer who could help him set-up an effective business structure. For new farmers, planning for CSA can be very difficult: farmers must ensure a certain amount of food for harvesting every week. Planning courses, workshops, or mentor support would be very valuable.

Furthermore, incentives or rebates could encourage consumers to purchase CSA shares, or government organizations such as hospitals and schools could offer to purchase shares or excess production. More government support for CSA marketing could expand citizen awareness of these programs.

#### *Infrastructure, Facilities, Equipment and Subsidies*

One of the many challenges for small-scale farmers is access to the facilities, equipment and infrastructure needed for a profitable farm business. Larger farms can justify investing in the needed facilities and equipment (e.g. cold storage rooms, tractors, automatic pickers). Small farmers benefit from similar facilities and equipment, but often cannot afford them on significantly lower production and income.

The interviews made it clear that for many new small-scale farmers, accessing capital and acquiring required tools can be very difficult. In addition to basic equipment (e.g. shovels, roto-tillers, deer fencing, and irrigation), other equipment and facilities can encourage production for small farms (e.g. greenhouses, processing facilities, storage facilities). Farmers noted two key policies could help small-scale farmers obtain the required equipment and infrastructure: tax exemptions and infrastructure grants.

The interviews revealed a need for both one-time individual infrastructure grants and larger grants for community owned infrastructure. One-time grants had helped purchase necessary but expensive infrastructure like deer fencing (increasingly required by urban farmers), greenhouses, and water wells. For example, Farmer #10 relied on grants for fencing and a water well to get them started. The deer fencing program that Farmers #10 and #13 used shared costs, with government providing matched funding: both farmers found the program effective. A fencing grant program could be administered provincially or locally, with provisions to prevent abuse by landowners for

non-agricultural uses.

There is also a need for larger, community-owned infrastructure that multiple farmers can use. Although small farms can seldom afford the facilities or equipment required to maximize productivity, there are numerous ways that small-farmers are working with local governments, farm associations, or farm cooperatives to purchase or build community-owned equipment and infrastructure. For example, farms and communities across B.C. have worked together on community-owned or cooperative abattoirs, storage facilities and packinghouses, wood chipping equipment, and pest-management programs. Additional funding from various levels of government can help develop local groups to obtain such equipment and infrastructure. Small infrastructure funding grant or loan programs may generate enough economic growth to allow participants to pay back a grant.

Community infrastructure first arose in my interview with Farmer #1, a soft fruit grower, local politician, and climate change activist in South Okanagan. This farmer began farming in 1980 after completing an agriculture diploma at McGill University. Farmer #1 was interested in the opportunities and challenges with agricultural subsidies. He gave me two examples of infrastructure subsidies that had benefited his community in the Okanagan Valley and that could easily be implemented elsewhere. First, he helped his local Regional District purchase three industrial wood chippers for lease to local growers to chip tree prunings and wood instead of burning them in large orchard fires. This community-supported purchase greatly reduces smoke pollution, and allows farmers to recycle valuable nutrients. A farmer could hardly purchase an industrial chipper independently.

Farmer #1 had also been actively involved in the sterile insect release (SIR) program in the South Okanagan. This program commenced after a rapid rise in codling moths in the mid-1990s nearly destroyed the apple industry. This community-funded program operates a laboratory that breeds sterile codling moths. These are released daily in select locations throughout the valley. The program has nearly eradicated the dangerous moth, but sterile moths must still be released to ensure the population does not rebound.

Without local subsidies from the Regional District, the moth could quickly wipe out the apple industry, affecting all farmers. Although the program began with federal and provincial funding, both sources have withdrawn. Farmer #1 emphasized the importance of community support:

Take away this SIR program, and I don't see any financial benefit or disadvantage. They are not cutting me a cheque, but there is a huge benefit to the environment. We don't fill up the valley with organophosphates. It is a measurable argument. We can actually show the drastic reduction in use through the reduction in purchases from local retail outlets.

One of the brothers at Farm #3 also supported expanding SIR programs to help local food systems become more secure and less chemical-dependent:

I think SIR should be expanded. There is a lot of opportunity to add sustainability and resiliency to our farming system. Organic and conventional growers benefited from it. SIR did a lot of work removing wild trees. They looked at a whole landscape level, or a regional level of a pest. We need to look at the regional level of predator/prey relationships. A body like SIR can help build a system that uses natural resources in the area. There are many predator insects that can be distributed to remove unwanted pests. We are capped by mountains, and mountains in this Valley so we can easily start building a regional strategy.

Since climate science shows that invasive insects will increasingly migrate north with temperatures increases, B.C. should assess which regions could benefit from SIR programs and fund programs in high-risk settings.

Farmer #13 was also very vocal about the need for more farm infrastructure and funding. This farmer had operated a 10-acre, certified-organic farm for 15 years, and his business model focuses on high-end and specialty organic crops. At the time, he was president of the British Columbia Small Scale Food Processor Organization (BCSSFPO). His farm features four distinct microclimates that he used strategically to grow specific crops. Farmer #13 also provided farm training and mentorship to new farmers in his area, and said that the biggest infrastructure requirements for both himself and new farmers are storage and production:

What I see needed, is on-farm infrastructure improvements. I can grow lots of squash, but I have nowhere to store it. We need capacity for winter crop storage, so that the farmer's income season is longer. The ability of regional foods to provide local supply could be much greater. I mean, right now we

have 800 garlic plants, and I store them in my bedroom closet. The whole house smells. We are seeing a bigger need for poly tunnels and greenhouses, which would extend the season, create longer employment, and add more local food production.

Farmer #13 also stated that support for local packing facilities or community-owned packing facilities would allow farmers to use their below-grade crops, generate off-season income, create local jobs, and generate a local winter food supply:

If I ever had the funds to build a processing facility here, I would tear down my barn and build it there. We could operate a year round facility. We could change our farm process to suit the value added industry. There are a lot of products that could be made on Vancouver Island, that are not being grown here. For example, a lot of farmers don't know what to do with their off grade, small garlic. Most just throw it away. If there was a processing facility, you could buy all that, and create minced garlic, or peeled cloves. We could stop importing this from China or Mexico. The general feeling is that we need central packing and processing facilities. I am not driving to Naniamo tomorrow with 10 pounds of tomatoes.

At the time of my interview, Farmer #13's only option to process his low-grade crops was to lease an industrial processing facility two hours away at a cost of thousands of dollars per day. As a result, this farmer, along with others I interviewed, had no choice but to compost off-grade crops.

Infrastructure subsidies or tax-relief programs to aid food production (e.g. greenhouses, water wells, or deer fences), storage (e.g. cold storage facilities, underground storage) and processing (e.g. processing facilities, industrial kitchens) could provide major benefits to small farms and local food economies. The challenge for policy makers is to locate regions with the highest need and to build and manage these facilities with minimal government oversight, or with effective oversight by local governments. There are opportunities to work with local agriculture groups, regional districts, municipalities, successful businesses and established cooperatives to build and manage these types of agricultural facilities.

Other community infrastructure that could help smaller-scale growers includes compost management facilities, community-owned or cooperative abattoirs, B.C. focused agriculture research programs, and outreach coordinators and extension agents for new farmers. For example, the Boundary Country Livestock Cooperative (BCLC) purchased a

\$300,000 mobile abattoir in 2013 that small-scale ranchers can use to help avoid the costs of building a meat processing facility.<sup>147</sup> Multiple government grants, including one through the Western Economic Diversification Fund, helped fund the mobile abattoir.

This community-owned abattoir helped small-scale farmers deal with strict meat-processing rules that created significant burdens for small-scale farmers. In 2004, B.C. introduced the Meat Inspection Regulations (MIR) that required small meat processors to build expensive new processing facilities. Many small farmers who had previously raised animals for sale were forced to cease selling to the public. As noted by the BCLC president Chris Mehmäl, farmers can no longer sell meat that is not processed in an inspected meat facility. These expensive facilities are rare in rural regions:

Everyone benefits from this investment, said Mehmäl. Now local producers won't have to ship their animals to Rock Creek or Kelowna for processing. Less travel means less stress and weight loss for the animal and less cost for the producer. Now local eaters will be able to buy government inspected meat directly from the farm or possibly right out of the grocery store.<sup>148</sup>

New provincial grants could help other communities purchase mobile abattoirs or similar facilities based on regional need. For example, Farmer #11 on Vancouver Island had been raising, butchering and selling livestock since the 1960s, and was forced to stop producing meat in 2004. This was significant revenue loss for his business. Farmer #11's diversified farm business included a roadside farm store and rental cabins, so he was able to overcome this set-back. Other, less diversified farmers may not have been so lucky. The brothers at Farm #3 also faced similar financial set-backs due to the 2004 meat processing rules:

When we first started, we used to raise ducks, chickens, pigs, and turkeys which was a good source of income. Essentially, the meat inspection rules basically shut us down. We can only butcher for our own consumption now. All the small butchers in town were forced to close – it was a huge income loss for us. Just recently there is a new mobile cutter who comes down from Kelowna with a butchering station. It's expensive, but it's a good option for now. Ideally, there should be a butchering option in every community.

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<sup>147</sup> Erin Perkins, "Mobile Abattoir Arriving in Grand Forks This Week, Operational by Spring," *The Boundary Sentinel*, December 17, 2014. <http://boundarysentinel.com/news/mobile-abattoir-arriving-grand-forks-week-operational-spring-22437#.VAouDUsnb6U>

<sup>148</sup> Perkins, "Mobile Abattoir."

The ideas discussed in this section represent a few of the policy programs that can help develop small-scale production, strong local food systems, and a resilient food system in B.C. They were among most commonly discussed issues in my farmer interviews. Land access and infrastructure are significant issues for new farmers, and provincial and local governments should seek new ways to reduce these barriers. The need for such programs will continue to grow if land prices in British Columbia remain high.

### **Policies to Develop Sustainable Consumption Habits**

A climate-resilient farm economy will require the re-direction of consumption to support small-scale agriculture, locally produced food, seasonal production and low-emission crops. Consumption habits were the most discussed issue in all my interviews. It is difficult to see how farmland preservation and new infrastructure and subsidy programs will succeed without a large consumer base ready and willing to purchase the products. In addition to greater consumption of local goods, a resilient food system will require consumers to shift consumption according to external climate scenarios as they impact local food production. For example, if local farms produce an abundance of leaf vegetables due to warm temperatures in the spring, consumers must be willing to consume more of these products in the spring to support farmers, in case late-season crops fail.

The reasons people choose certain foods are complex and encompass many different elements. These include financial habits, socioeconomic status, cultural preferences, religious practices, individual health requirements, general physiological needs, and social/environmental concerns. All of these factors affect efforts to shift consumption, and may frustrate blanket solutions to transform consumption problems. Policies to shift overall consumption should respect the personal values embedded in consumption.

Despite the complex social factors that influence consumption habits, policy makers should find new ways to inform consumers about the impacts of consumption decisions. Consumers require more information to understand how certain consumption

decisions can increase GHG emissions, reduce food security, weaken local food production, and create negative environmental externalities elsewhere. Modern grocery chains provide very little information of this kind. This allows consumers to ignore the environmental repercussions of their consumption decisions and to base these decisions instead on price, individual health, or convenience.<sup>149</sup>

### *Labeling*

Improved food labeling is an effective and versatile policy tool to help consumers make more informed and sustainable choices.<sup>150</sup> Currently, no mandatory labeling requirements in B.C. or Canada, aside from origin labeling, help consumers identify products that support a sustainable and resilient food system. One brother at Farm #3 believed labeling was the most important policy tool to shift consumption:

We have to sort our labeling system out, so consumers can make intelligent decisions. You don't see any advertising on television for BC products. You only see advertising from California. I think there is a much bigger role for government to play here.

Farmer #4 was heavily involved in an organization that markets new varieties of apples. He was also concerned that B.C. farmers, farm organizations and governments were not successfully advertising the benefits of B.C. products:

One mistake we've made as an industry, is advertising to people on what we do and how we farm. For example, in B.C. we're fortunate because the climate is ideal for growing tree-fruit. Because of the dry climate we use far less sprays than other regions. In Ontario, they have to spray 23 times for apple scab, where we only spray once or twice. By the time B.C. apples and cherries get to the consumer, there are no spray residues on our fruit. Comparatively, apple farmers in other regions, including organic farmers, are spraying right up to harvest so the food has those residues. In B.C. we are creating a lot of extra value, but the customer can't see it, and we're not telling people about these strengths. From a marketing perspective we kind of dropped the ball.

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<sup>149</sup> The following paper provides a strong academic perspective of the challenges associated with shifting consumption habits and a good policy summary of some policy tools available to help shift consumption habits: Lucia Reisch, Ulrike Eberle, and Sylvia Lorek, "Sustainable food consumption: an overview of contemporary issues and policies," *Sustainability: Science, Practice, and Policy* 9, no. 2 (2013): 7-25.

<sup>150</sup> Nutrition labeling requirements have expanded over the past 20 years, and research confirms that improved labeling has helped consumers make more health-conscious consumption decisions. Inge Spronk et al., "Relationship between Nutrition Knowledge and Dietary Intake," *British Journal of Nutrition* 111, vol 10 2014, 1713-1726.

Many of the farmers interviewed wanted more information on food production to reach consumers, so they could make more informed choices. The following section will review the opportunities and challenges associated with these three types of labeling requirement.

Although all the farmers interviewed discussed the importance of shifting consumption towards local products, few of the participants provided concrete policy options for specific labeling improvements. Mandatory labeling does not directly impact many small-scale farmers, as fresh products (produce and meat) and products sold directly to customers do not require nutrition or origin labels.<sup>151</sup> Many farmers confirmed that the direct connection between farmer and consumer provides consumers firsthand knowledge of food production, a superior information-sharing technique to labeling. Farmer #9 highlighted the issue: “my customers don’t care if it is organic, they buy from me because it’s local and they trust me.” Other farmers also noted that these direct relationships with consumers helped convey positive information about their products. Although these connections are valuable, they are only possible with farm-market or CSA sales; modern grocery chains separate farmer from consumer.

Although labeling does not directly impact many small-scale producers, it is important to review it for two reasons: first, many small-scale farmers in B.C. have adopted organic certification and labeling to guarantee their goods use stricter environmental processes and bring in the additional income associated with organic goods. Additionally, labeling (and marketing) of the local products of larger growers, such as the Buy BC program discussed later, may strengthen consumer awareness of the importance of local food. Similarly, emissions labeling of imported goods (either “positive” or “negative”) may encourage consumers to favor local and low-emission products.

Although labeling can help inform consumers about environmental externalities of goods, policy makers must grapple with the unique challenges of labeling, including whether labels should be optional or mandatory, and if labels should be positive (e.g.

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<sup>151</sup>Canada, Canadian Food Inspection Agency, “Foods Usually Exempt from Carrying a Nutrition Facts Label” <http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/nutrition-labelling/exemptions/eng/1389198015395/1389198098450?chap=2> (Accessed February 24, 2015).

recognition of low-emission products, such as the *EnergyStar* program<sup>152</sup>) or negative (recognition of high-emission products). Furthermore, policy makers should ensure that complex regulatory requirements do not place unnecessary burdens on producers, including small-scale or local farmers. Unnecessary regulatory burdens are costly (possibly raising product prices), and will likely be strongly opposed by producers and business groups. Historically, optional and “positive” labeling requirements are easier to implement and trigger less opposition from producers. This issue is explored in the following chapter.

### *Organic Labeling*

One particularly common environmental label in modern agriculture is the “organic” label. For many consumers, organic labeling signifies food produced without pesticides or chemical fertilizers. It is generally associated with positive environmental values. Organic production will be an integral element of a resilient food system: it requires fewer chemical inputs and, if done properly, can reduce on-farm emissions.<sup>153</sup> The emission gains are primarily from the elimination of nitrogen fertilizer, crop rotation as alternatives, composting, and low tillage.

A recent study on Canadian corn, canola, soy, and wheat farms shows that organic production would reduce energy use by 40%, greenhouse gases by 23%, and ozone-depleting gases by 83%.<sup>154</sup> Many farmers interviewed used organic methods, most commonly because they commanded higher prices, lower input costs (less chemical fertilizers), less reliance on industrial pesticide manufacturers, safer work environments, and less pesticide cross-contamination.

The organic food industry has grown rapidly over twenty years, but not without procedural challenges. Organic certification and labeling requirements were discussed with a number of farmers in the interview process. To certify with the Certified Organic

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<sup>152</sup> The *EnergyStar* rating is designed to bring awareness to electronic products that meet higher energy efficiency standards compared to other products in their class.

<sup>153</sup> For a comprehensive review of the environmental benefits of organic agriculture, including research on the lower GHGs produced by organic farmers, see: <http://www.fao.org/docrep/005/y4137e/y4137e02b.htm#96>

<sup>154</sup> Nile Pelletier et al., “Scenario Modeling Potential Eco-Efficiency Gains from a Transition to Organic Agriculture: Life Cycle Perspectives on Canadian Canola, Corn, Soy, and Wheat Production,” *Environmental Management* 42, no.6 (2008): 990.

Farming Association of British Columbia (COABC), farmers undergo a rigorous three- to four-year process that includes inspections, tests, and training. The COABC is a strong organization that unites organic farmers across BC, provides agricultural training (including GHG mitigation techniques), markets organic food, coordinates services between the fifteen certifying bodies in B.C., and works with government to improve organic farming.

The general consensus among organic farmers interviewed was that a lot of work remained to strengthen (and expand) the organic certification process, simplify the paperwork and inspections, and streamline discrepancies between the fifteen certifying bodies. All the certified organic farmers interviewed expressed frustration with the certification process, and the difficulties associated with one body (the COABC) representing a diverse group of farmers.

The opportunities and challenges with the COABC are too big to cover in this paper, and the COABC has outlined these issues well in their own annual reports. Their 2013 report lists the major issues, opportunities, challenges, and key players for farms, processors, distributors, and retailers.<sup>155</sup> It also articulates five key policy areas, along with the corresponding policies needed for the COABC to move forward. These policy areas are the unity of the BC certified organic sector, branding and education, advocacy and alliances, capacity building, and standards.

Aside from these issues, my interview process highlighted two important improvements to help consumers identify environmentally positive consumption decisions. First, certified organic farmers were frustrated with non-certified growers calling their products “organic.” Second, farmers wanted greater support for advanced organic labeling options, such as “biodynamic” certification, with far stricter environmental standards.

When Canada adopted a national organic standard in 2009, it allowed food grown and sold in B.C. to be labeled “organic” without certification; only food shipped inter-provincially required certification to be labeled organic. This allows farmers to call their

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<sup>155</sup> Certified Organic Association of British Columbia, “Stretching Our Horizons: A Strategic Plan for the BC Certified Organic Sector: 2013-18”  
[http://certifiedorganic.bc.ca/docs/2013\\_Organic\\_Sector\\_Strategic\\_Planning\\_Project.pdf](http://certifiedorganic.bc.ca/docs/2013_Organic_Sector_Strategic_Planning_Project.pdf)

goods “organic,” without costly and time consuming certification process, and potentially without even operating organically. Farmer #10 confirmed this has created mass confusion at farmers’ market, forcing their farm to drop prices in line with conventional goods:

These farmers are riding on our backs. They’ve been doing it for twenty years now. It actually got worse when the Canadian standards came out. It was broadcast that you can still say you were organic and you didn’t have to be certified. We know farmers who use outlawed chemicals, and call their produce organic. Other farmers have admitted they will say anything their customers want to hear. Our farmers’ market won’t do anything about it until the province changes its policy.

Farmer #13 felt similarly about the importance of stricter labeling requirements:

The use of the word organic needs to be protected. If you use the words naturally grown, organic, or bio-organic, it has to be required by law that that term is followed by a transitional or certified number. The government must be clear that if you say organic, you must follow it with a number. The government could advertise, from July 1<sup>st</sup> 2011 all food you buy in BC will be ensured to be labeled correctly

Farmer #10 noted that this policy change “wouldn’t cost a penny. It is all wording. Change the wording and pass it. This would help us financially and make it easier for people trying to abide by strict organic standards.”

Farmer #9 spoke of the same frustration with non-certified farmers advertising as organic. None of Farmer #9’s products was shipped out of province, so they were planning to drop their certified status:

It is expensive and complicated. It costs about \$1800 a year, the paper work is insane, and anyone else can come in and say they are organic. The public just doesn’t understand it. If certified organic meant something, we would stick with it. We don’t mind paying the money, but at this point in time it means absolutely nothing. If you protect the word organic, then you tell the other guys they can use ‘natural grown,’ then we can have control of the market. Right now it doesn’t mean anything.

There are numerous challenges with this issue. Primarily, it potentially nullifies the local effectiveness of the “organic” label, as consumers cannot be sure that the producer used strict environmental standards. Although consumers can speak directly to farmers or visiting farms, this is inconvenient. On the other side, stricter protections for the label

could create marketing challenges for small-scale farmers who want to use organic principles, but cannot afford or do not want certification. This could cause consumers to avoid these products. The Province can work with the COABC, organic farmers, and non-certified organic growers to find new ways to ensure organic products are properly labeled. This may include new advertising/marketing for certified products (e.g. a standardized “check mark” logo for farmers to display at farmers’ market), public education initiatives on the difference between certified and non-certified products, or a provincial-brand for a non-certified (e.g. “naturally grown”) label.

The second issue that multiple farmers raised was the need for stronger advanced organic certification labeling. As organic agriculture expands, there is a greater need to distinguish farmers that go beyond the standard. Some organic farmers were exploring the “biodynamic” certification process for standards stricter than conventional organic.<sup>156</sup> Many farmers already practiced advanced-organic standards (for example, they only use local compost and don’t use “organic” sprays), so a label could publicize these features.

Farmer #2 had hoped to charge a premium for advanced certification over other organic or ‘natural’ growers. Biodynamic certification requires local composting (convention organic can purchase organic chemicals from around the world), seed saving, and insect predator corridors.<sup>157</sup> The certification process and marketing in B.C. are very weak: the Biodynamic Agriculture Society of B.C. does not have a website, a standard certification process, or branding and marketing functions. If government can work with the COABC to implement advanced organic labeling, consumers could make more informed decisions on sustainable products, which may provide an additional boost for local products. The COABC has been a strong partner in provincial agriculture policy for the past decade, and the provincial government should continue to work with their members and provide funding for their programs, and find new ways to support local and sustainable agriculture in B.C.

### *Location Labeling*

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<sup>156</sup> Society for Bio-Dynamic Farming and Gardening in Ontario, “What is Bio-Dynamic Agriculture,” <http://biodynamics.on.ca/about/> (Accessed November 6, 2014).

<sup>157</sup> Society For Bio-Dynamic Farming and Gardening in Ontario, What Is Bio Dynamic Agriculture, <http://biodynamics.on.ca/about/> (Accessed February 28<sup>th</sup>, 2015).

There are numerous opportunities to expand labeling and marketing of local food products. Currently, food products sold in Canada must be labelled for the country of origin, with the exception of unpackaged food (e.g. bulk potatoes) and fresh fruit and vegetables grown and sold in Canada.<sup>158</sup> Canadian producers can opt to label their food with “Canada” if they choose. Although these federal regulations help consumers identify imported goods, there is significant room for British Columbia to label and actively promote provincially produced products. Active promotion of more local goods could include a specific “Grown in B.C.” label and a marketing campaign that highlights the environmental importance of local food.

In the 1990s B.C. initiated the BuyBC program, based on a strong brand identification and marketing campaign. The program allowed farmers and producers to include a BuyBC sticker or label on their goods, with active provincially-funded branding and marketing. Many farmers interviewed knew about the program’s successes, and were unsure why it was cancelled. The program had overwhelming citizen support: the B.C. Agriculture Council claims the program was the “most successful food and beverage advertising program ever jointly undertaken by the provincial government and private industry” and that the BuyBC logo achieved 75% consumer recognition.<sup>159</sup> Furthermore, a 1996 review of the program estimated that the program had helped generate 1900 jobs in the agri-food sector over a three-year period.<sup>160</sup>

Less than ten years after BuyBC was enacted, a newly elected government cancelled the program to save money and reduce taxpayer funded advertising. This was done despite acknowledgement by John van Dongen, then B.C. Minister of Agriculture, Foods and Fisheries, that the program was successful. The following quotation is from a Question Period exchange between van Dongen and the agriculture critic:

Well, certainly, speaking first of all to the overall Buy B.C. program, I share the member's view that it was a good program. It was in place for

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<sup>158</sup>Canada, Canadian Food Inspection Agency, “Country of Origin: Fresh Fruits and Vegetables” <http://www.inspection.gc.ca/food/labelling/food-labelling-for-industry/fresh-fruits-and-vegetables/eng/1393800946775/1393801047506?chap=12> (Accessed February 24<sup>th</sup>, 2015).

<sup>159</sup> British Columbia Agriculture Council, “The BuyBC Program,” [www.bcac.bc.ca/buybc](http://www.bcac.bc.ca/buybc) (Accessed December 14<sup>th</sup>, 2014).

<sup>160</sup> Investment Agriculture Foundation of British Columbia, “Branding BC Agriculture and Food Products,” [http://www.iafbc.ca/publications\\_and\\_resources/documents/Branding\\_Study.pdf](http://www.iafbc.ca/publications_and_resources/documents/Branding_Study.pdf) (Accessed December 14<sup>th</sup>, 2014).

about eight years and was well supported, I think, through that time. It was successful in creating a high level of consumer identification with the Buy B.C. logo and the buy local logo and some of the other themes and logos that were part of the program. Certainly I think that one of the performance evaluations of the program indicated that there was something like an 80 percent consumer recognition. That being said, when this government took office, one of the things we looked at was all taxpayer-funded advertising. That was one of the things that caused this program to be reviewed. In the overall analysis of the critical needs for health care and education and the deficit situation that we find ourselves in, in weighing those various interests and the use of taxpayers' dollars, it was decided to discontinue the public funding of the program.<sup>161</sup>

After funding for BuyBC was cancelled in 2002, the Province licensed the rights to the BuyBC brand to the B.C. Agriculture Council (BCAC). Without provincial funding for business participation and marketing, BCAC has struggled to continue the program.<sup>162</sup>

There is a strong need for a new local-food marketing campaign that can raise awareness for B.C. products. One option is to restore the BuyBC program with sufficient funding for compliance and marketing; numerous groups support this option, and a study on climate change commissioned by the Province and federal government commented: “Re-invigorating the BuyBC brand could have similar marketing benefits as a carbon label in domestic markets, without the need to conduct a product footprint for each product. Buy BC does not address the issue of on-farm emissions, but choosing local foods can reduce emissions from transportation.”<sup>163</sup>

After the BuyBC program, the Province has used several smaller local-food marketing campaigns. For example, in 2012 the Province initiated the “Buy Local” program, which supports individual marketing campaigns initiated by various sector associations or agri-groups. Applicants can apply for support (up to \$100,000), but must match any funding. For example, the first group to use the program was the B.C.

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<sup>161</sup> British Columbia, *Debates of the Legislative Assembly*, Estimates: Ministry of Agriculture, Food and Fisheries, August 9<sup>th</sup>, 2001, (John Van Dogen, Liberal)  
<http://www.leg.bc.ca/hansard/37th2nd/h10809p.htm#429>

<sup>162</sup> Branding BC Agriculture and Food Products,  
[http://www.iafbc.ca/publications\\_and\\_resources/documents/Branding\\_Study.pdf](http://www.iafbc.ca/publications_and_resources/documents/Branding_Study.pdf)

<sup>163</sup> British Columbia, Ministry of Agriculture. “Carbon Footprints and Labels in a B.C. Agriculture Context” Victoria, B.C.: Government of British Columbia, 2010. [http://www.bcagclimateaction.ca/wp/wp-content/media/report-Carbon\\_Footprinting\\_Analysis\\_2012.pdf](http://www.bcagclimateaction.ca/wp/wp-content/media/report-Carbon_Footprinting_Analysis_2012.pdf)

Cranberry Marketing Commission, who received \$15,700 to “help promote berries to consumers and value-added producers.”<sup>164</sup> The program is not specific to food products, and has been used by flower producers, wineries and the pet food industry.<sup>165</sup> There is no province-wide branding or marketing effort with the current Buy Local program.

A review of disbursements from the Buy Local program show that this program has helped over 20 branding or advertising campaigns between 2012 and 2014.<sup>166</sup> While programs to support individualized marketing campaigns (e.g. marketing for local apples) are undoubtedly useful, they fail to achieve the “coordinated branding” effort that may be required to raise greater awareness for local food.<sup>167</sup> For example, a detailed study commissioned by the Investment Agriculture Founding of B.C. on branding B.C. food industry reviewed a host of policy ideas for marketing local food, but ultimately affirmed the need for a unified provincial branding program: “a strong provincial branding program will complement and improve the effectiveness of the various branding and promotion initiatives already operating in B.C.”<sup>168</sup>

While local-food labeling and marketing can raise awareness for B.C. produced food, the Province should explore additional opportunities to include marketing that highlights the reasons why local food is important. For example, future campaigns could include advertising about climate problems in other regions (e.g. our over-exposure to California’s drought problems), highlight the positive environmental attributes associated with small-scale agriculture, or promote the positive impact local food has on community development and local economies. It may be possible to capitalize on the “negative” marketing messages utilized by the Return-It recycling campaign by Encorp Pacific, whose current slogan is “Every juice carton you don’t recycle says something about

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<sup>164</sup> British Columbia, Ministry of Agriculture. “B.C. cranberries promoted as holiday and everyday food,” Victoria, B.C.: Government of British Columbia, 2012 [http://www2.news.gov.bc.ca/news\\_releases\\_2009-2013/2012AGRI0045-001993.pdf](http://www2.news.gov.bc.ca/news_releases_2009-2013/2012AGRI0045-001993.pdf)

<sup>165</sup> British Columbia, Ministry of Agriculture, “BC Buy Local Program,” <http://www.gov.bc.ca/agri/buylocal.html> (Accessed February 14th, 2015).

<sup>166</sup> BC Buy Local Program. <http://www.gov.bc.ca/agri/buylocal.html>

<sup>167</sup> Branding BC Agriculture and Food Products, [http://www.iafbc.ca/publications\\_and\\_resources/documents/Branding\\_Study.pdf](http://www.iafbc.ca/publications_and_resources/documents/Branding_Study.pdf)

<sup>168</sup> Ibid.

you.”<sup>169</sup>

The Provincially administered “Sodium Sense” campaign provides another possible format for promoting local food.<sup>170</sup> Sodium Sense was designed to inform the public on the dangers of excessive sodium consumption. It featured full-sized advertisements in bus stops, magazines, and billboards across the province. It also featured an online website, sodium calculator and a “sodium fact contest” for a \$5000 grocery gift certificate. A similar program could easily highlight the importance of low-emission consumption and local food. For example, bus stop ads could display emissions information on common food choices such as animal protein vs. vegetable protein or local fruit/vegetables vs. imported goods.

A new local-food labeling or marketing campaign could be administered by the Ministry of Agriculture, or by an external association, such as BCAC. Deferring responsibility to administer a labeling or marketing campaign to the BCAC, the BC Association of Farmers’ Market (BCAFM), or the B.C. Food Processors Association could help incorporate farmer/producer perspectives, and possibly distance the Province from any challenges with the program such as messaging issues, funding issues, or conflicts between local food promotion and other social policy issues (e.g. low cost food alternatives for low-income citizens).<sup>171</sup> Overall, numerous programs can get information to consumers, and highlight the role that local food can play in building a secure and resilient food system in B.C. The Province should continue work with farms and farm associations to implement the best possible option.

### *Carbon Labeling*

In addition to organic and location labeling, GHG labeling can help consumers identify more sustainable consumption choices. In 2006, the UK’s Carbon Trust organization implemented the world’s first carbon label. These voluntary labels provide information on a product’s CO<sub>2</sub> emissions, and assure purchasers that the company is

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<sup>169</sup> Return-It Program, <https://www.return-it.ca> (Accessed February 24<sup>th</sup>, 2015)

<sup>170</sup> British Columbia. Healthy Families B.C. “Sodium Sense,” Victoria, B.C.: Government of British Columbia, 2011. <http://www.healthyfamiliesbc.ca/home/articles/topic/sodium> (Accessed January 13, 2013).

<sup>171</sup> The recommendation to administer a new labeling or marketing program is recommended by this industry paper. [http://www.iafbc.ca/publications\\_and\\_resources/documents/Branding\\_Study.pdf](http://www.iafbc.ca/publications_and_resources/documents/Branding_Study.pdf)

making efforts to reduce those emissions.<sup>172</sup> Third-party researchers verify all emissions. Switzerland has also introduced an effective carbon-labeling program called *ClimaTop*.<sup>173</sup> The Swiss approach only offers labels to products that reduce emissions by 20% compared to other products in that class. For example, a milk producer could receive the label if their emissions were 20% less than other producers. *Climatop* uses a life-cycle analysis that includes both CO<sub>2</sub> emissions and other environmental impacts. The label is only valid for two years, at which time the product must receive another assessment. This is similar to the successful *EnergyStar* label in North America that is used to designate electrical appliances that achieve specified energy savings.<sup>174</sup>

In 2012, the B.C. Ministry of Agriculture and BCAC, with support from the Government of Canada, commissioned a detailed research paper on opportunities to improve carbon labeling in B.C. agriculture.<sup>175</sup> The report reviews many government- and industry-led carbon labeling programs around the world, and interprets these lessons within a B.C. context. The report concludes with 7 recommendations for the Province, including possible “Next Steps,” which include program-planning, piloting and roll out. The report provides four practical recommendations for a future B.C. lead carbon-labeling program:

1. Research which carbon labels would provide the most value to BC producers and processors and provide educational materials on the costs, process and potential benefits and drawbacks
2. Provide financial or marketing incentives to early adopters who are interested in the use of existing labels (for example, the Carbon Reduction Label).
3. Create or promote “practice-based” labels that are available to producers or processors who have conducted a footprint or instituted certain carbon reductions projects

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<sup>172</sup> United Kingdom, Carbon Trust, *Carbon Footprint Labels from the Carbon Trust*. <http://www.carbontrust.com/client-services/footprinting/footprint-certification/carbon-footprint-label> (Accessed February 4, 2012).

<sup>173</sup> Ecolabel Index, “Climatop,” <http://www.ecolabelindex.com/ecolabel/climatop> (Accessed March 1, 2015)

<sup>174</sup> Government of Canada, Energy Star in Canada, <http://www.nrcan.gc.ca/energy/products/energystar/12519> (Accessed February 25th, 2015).

<sup>175</sup> British Columbia, Ministry of Agriculture. “Carbon Footprints and Labels in a B.C. Agriculture Context” Victoria, B.C.: Government of British Columbia, 2010. [http://www.bcagclimateaction.ca/wp/wp-content/media/report-Carbon\\_Footprinting\\_Analysis\\_2012.pdf](http://www.bcagclimateaction.ca/wp/wp-content/media/report-Carbon_Footprinting_Analysis_2012.pdf)

4. Develop a label from scratch or augmenting the existing Buy BC label to include product footprints<sup>176</sup>

As of 2014, little indicates that the Ministry of Agriculture has pursued any recommendations from the Climate Smart report. This is possibly due to financial constraints, or lack of political will power. This comprehensive research paper provides a template for government to improve labeling on sustainable consumption choices for B.C. consumers. In absence of federal emission labeling requirements, B.C. could work with other provinces create a provincially-led program.

#### *Education Opportunities in Public Institutions*

British Columbia's public institutions, including schools, hospitals, community centres and prisons, offer ideal locations to promote local food. Public institutions are a particularly effective means of communicating information to the public, as they reach people from different demographics and those with different ethnic and financial backgrounds. For example, the school system can help reach children and their families, while hospitals can reach a broad spectrum of people who interact (either as patients, visitors, or employees) with the health care system. Research by the B.C. Provincial Health Services Authority (PHSA) helps confirm the role that public institutions can play in increasing consumption of sustainable and local food:

These institutions provide oversight for many of the environments where children, youth and adults live, work, learn, play, heal and eat. They have access to a variety of tools, resources and opportunities that can transform environments and influence healthier behavioral choices. As purchasers of food, these institutions have a formidable capacity to shift the balance and re-localized food production. Most importantly, there are well-established relationships among these institutions and they are already providing leadership by taking action in this area.<sup>177</sup>

The PHSA paper outlines several ways that public institutions can build support for local food. For example, they provide five ideas to teach students: update curriculum on all aspects of the food system from production to consumption; incorporate field trips to farms, gardens or production facilities; organize lunch

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<sup>176</sup> Carbon Footprints and Labels in the BC Agriculture Context, 22.

<sup>177</sup> Public Health Services Authority, "Promoting Healthy Eating and Sustainable Local Food in B.C." June 2011, 6. <http://www.phsa.ca/Documents/foodactionframeworkforpublicinstitutions.pdf>

lectures and workshops; implement local food education campaigns; and teach agricultural skills development for staff and students to learn about production and preparation.<sup>178</sup>

Similarly, a report the Public Health Association of B.C. prepared on local food in Vancouver skills outlines a number of programs that public schools can use to increase awareness and consumption of local food.<sup>179</sup> For example, school lunch programs expand consumption preferences and highlight the importance of sustainable consumption.

In interviews, several farmers in the South Okanagan mentioned the “Farm to School Salad Bar” program at the Oliver Elementary School, which provides healthy lunches of local food twice per week. The program website states:

Each school will offer a salad bar twice per week loaded with fresh local foods from nearby farms. Salad ingredients are delivered to the school by a variety of farmers including Localmotive – a cooperative of local organic farms. Salads are prepared by students in South Okanagan Secondary School as part of their foods training program. Foods are then delivered to the secondary school cafeteria and across a field to nearby Oliver Elementary School. The two schools share a multicultural population of 875 K- 12 students. Their action plan focuses on building community/school partnerships and ongoing education. These partnerships will include establishing a working relationship with local farmers, the community nutritionist, community food advocates and service clubs. In Oliver we plan to provide knowledge and hands-on experiences for students on nutrition as well as local food production including planting, harvesting, processing, preserving, and composting. It is through this unique collaborative effort of our two schools and our community partners that we expect to reach our goal of making locally grown produce available to all students.<sup>180</sup>

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<sup>178</sup> Promoting Healthy Eating and Sustainable Local Food in B.C., 11.

<sup>179</sup> Public Health Association of British Columbia, “Scaling up Local Food Procurement in Greater Vancouver Public Schools,” April 2013, 19.  
[http://www.phabc.org/userfiles/file/ScalingUpLocalFoodProcurementinGreaterVancouverSchoolDistricts-May3\\_2013.pdf](http://www.phabc.org/userfiles/file/ScalingUpLocalFoodProcurementinGreaterVancouverSchoolDistricts-May3_2013.pdf)

<sup>180</sup> Information on these programs can be found on the Public Health Association of B.C. website under the “Farm To School Program” Map page. This webpage provides resources and coordination materials for schools that want to start their own program. Public Health Association of British Columbia. Farm to School Program. “Put Your Farm to School Program on the Map.”  
[http://www.phabc.org/modules.php?name=Ftsreg&pa=list\\_schools&pid=11&sid=1&ok=2](http://www.phabc.org/modules.php?name=Ftsreg&pa=list_schools&pid=11&sid=1&ok=2) (Accessed March 15, 2012)

These programs offer an ideal opportunity to expand students' tastes, and understand the relationships between local food, health, and sustainability. They also ensure that students from different socioeconomic backgrounds receive the message about sustainable consumption. Teaching children about different types of food may help them shift towards seasonal based diets and food that is easily grown in B.C.'s climate. As previously mentioned, a number of the farmers interviewed were involved with local elementary schools, providing added income for farmers, and teaching students about new foods, growing food, and the importance of local agriculture.

Other public institutions can also educate citizens on food emissions. Hospitals in particular are the perfect place to educate a diverse group of citizens on consumption impacts. Over the last 30 years, hospitals across Canada have moved away from local food and in-house production. The privatization of public hospital cafeterias is well documented:

[In the 1980's] most Canadian hospitals still had well-equipped, well-staffed kitchens, where cooks produced almost everything from scratch. That changed in the 1990s. Budget cuts and pressure to privatize saw many Canadian hospitals outsource food service to companies like Aramark, Sysco, Compass and Sodexo. Cooking staff were laid off, and kitchens renovated to accommodate larger freezers and "rethermalization" ovens that could quickly heat up pre-packaged meals from centralized plants. The shift from conventional cooking to heat-and-serve meals reduced labour costs by as much as 20 per cent.<sup>181</sup>

Reversing centralized food preparation will be difficult, but it is possible with provincial funding and guidance. For example, the Ministry of Health could provide information on popular recipes, successful methods of purchasing and storing food, and ways to accommodate individuals with special dietary needs. In Ontario, Scarborough Hospital is the first in Canada to integrate in-house production of local foods successfully. With the assistance of grants from the provincial government, the hospital cooks its own food using 20% local ingredients.<sup>182</sup> Other local food advocacy groups, such as the "Farm to Cafeteria Canada," focus on getting more local food into Canada's schools and

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<sup>181</sup> Colleen Kimmett, "Can Hospital Food be Fixed," *The Tyee*, October 17, 2012. <http://thetyee.ca/News/2012/10/17/Can-Hospital-Food-Be-Fixed/>

<sup>182</sup> Daniel Schwartz, "Hospital food 'revolution' takes root," *CBC News*, July 3, 2012. <http://www.cbc.ca/news/health/hospital-food-revolution-takes-root-1.1162341>

hospitals.<sup>183</sup> This particular network offers numerous policy options to get local food into public institution, including a particular program where local farms deliver and prepare meals on select days.

### *Public Space for Agriculture*

Public institutions can also help support local agriculture by providing space for urban agriculture, community gardens, farm markets, or smaller “pocket markets.” This concept is also supported by the PHSA, who acknowledge that “unused or underused land is an important resource that institutions can leverage for food production.”<sup>184</sup> The PHSA highlight the George Pearson Centre, which is a 120 resident facility in Vancouver for adults living with a disability. It has partnered with five urban farmers to turn half an acre of their lawn into an urban garden: “The farm provides fresh produce for meals served to the centre’s residents. This garden also serves as a tool to raise awareness about health eating and teach skills on food production to residents, staff, and community members.”<sup>185</sup> The couple at Farm #14 was working on a similar business proposal to create a small-scale farm at a seniors housing complex near his current farm. These relationships, between farmers and residential facilities, offer a very effective way to link growers to a large customer base.

### *Food Waste*

Noteworthy education initiatives address the global problem of food waste. Globally, Gustavsson et al. estimate that 1/3 of all food produced is wasted.<sup>186</sup> Waste is problematic as land and labour resources are required to produce food that will not be consumed, and also because unused food in landfills is a source of methane production. In developing countries, waste happens primarily at the production stage due to poor farming and storage practices. In developed countries, waste happens at later stages with

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<sup>183</sup> Public Health Association of British Columbia. Farm to School Program. “Farm To Cafeteria Canada. [http://www.phabc.org/files/farmtoschool/2012\\_conference/Joanne\\_Bays.pdf](http://www.phabc.org/files/farmtoschool/2012_conference/Joanne_Bays.pdf)

<sup>184</sup> Promoting Healthy Eating and Sustainable Local Food in B.C., 14.

<sup>185</sup> Promoting Healthy Eating and Sustainable Local Food in B.C., 15.

<sup>186</sup> Jenny Gustavsson et al., “Global food losses and food waste – Extent, causes and prevention,” Study prepared for the International Congress of the Food and Agriculture Organization of the United Nations. Rome, 2011. <http://www.fao.org/docrep/014/mb060e/mb060e.pdf>

retailers and consumers, as food spoils on store shelves and in consumers' homes.<sup>187</sup>

Reisch et al. suggests that “The reasons for such wastage range from poor menu planning and a general lack of food competence (i.e., knowledge of food freshness and storability) to huge package sizes enabled by large home-storage capacities and the attractiveness of quantity discounts at points of purchase.”<sup>188</sup> As there is a wealth of information on ways to reduce food waste, this issue will not be explored in this paper.<sup>189</sup> British Columbia could incorporate food-waste education or advertising into other strategies designed to support local food production and reduce agricultural emissions.

Although consumption changes may come as a result of specific labeling or education policies, they may also be triggered by more general programs such as a higher carbon tax on fuel, mandatory emission reductions across industries, or by general education campaigns about climate change and its consequences.

### **Training Farmers and Agriculture Education Opportunities**

The final issue frequently discussed in my interviews was education and training for new or current farmers. A resilient food system in British Columbia needs a talented and diverse group of farm owners, farm labourers, and agriculture businesses. In addition to farmers, a resilient system will require a diverse agriculture education system that can train new farmers, upgrade the skills of older farmers, and provide business advice to producers and farm businesses. A strong farm education system will help new farmers to quickly enter the industry if a climate crisis rapidly reshapes the agriculture economy, or upgrade the skill of farmers to deal with new extreme weather scenarios. Increasing the number of farmers should be a key policy for B.C., as nearly 50% of Canadian farmers are over the age of 55, and the past practice of younger generations taking over family farms is in decline.<sup>190</sup>

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<sup>187</sup> United Nations Environment Program, “Food Waste Facts,” <http://www.unep.org/wed/quickfacts/> (Accessed January 18, 2012).

<sup>188</sup> Reisch et al., “Sustainable food consumption”, 14.

<sup>189</sup> Promoting Healthy Eating and Sustainable Local Food in B.C., 16

<sup>190</sup> Renata D’Aliesio, “Many young people are taking another look at the family farm,” *The Globe and Mail*, August 15, 2012. <http://www.theglobeandmail.com/news/national/many-young-people-are-taking-another-look-at-the-family-farm/article4483574/?page=all>

Agriculture is a complex and multi-faceted industry, with most farmers undergoing many years of trial-and-error learning before they become experienced and profitable producers. All scales of farming, including small-scale and polyculture production, require deep knowledge of weather patterns, soil types, plant species, planting and growth patterns, harvesting schedules, fertilization and pest management, and proper pruning techniques, among countless other skills. Unlike industrial or mono-crop production, small-scale farming is unique in that farmers must understand how these factors relate to a huge diversity of crops, and may also require knowledge on raising animals. As well as production knowledge, new farmers are required to learn about small business finances, marketing, municipal bylaws, food safety standards, staffing requirements, marketing and labour code. This steep learning curve, in addition to high land prices, deters new farmers.

The interview participants had diverse educational backgrounds, and many interviews highlighted how agricultural training benefits farmers. In other cases, the interviews highlighted the difficulty that many new farmers face in starting a profitable farm business without prior training. Farmer #11, among the youngest in my interview pool, had only been farming for one year. He summarized his experience:

For us, farming isn't just about farming. It's about science; we really have to know our soil science and about pests too, so there is a lot of biology involved. We also have to be very entrepreneurial, as we have to compete with other small-scale farmers. What is it that we're doing that's different from the rest? This often involves communication skills, and working with our clients to make sure they're happy, especially with door-to-door deliver. You also have to be mechanically inclined to fix any of your mechanical equipment. You need to be a jack-of-all-trades to do this.

Farmer #11 also expressed frustration at not being able to get agricultural training in the public school system: "When I was in high school I was never given the opportunity in my Career and Personal Planning training to see farming as a viable career choice. We need to work with schools to start regarding farming as a trade, or a real occupation."

The diverse skill set required to run a profitable farm business means that without these skills, failure rates increase. Neither partner at Farm #5 had received any formal agricultural training, nor had they completed an apprenticeship or worked at another

farm before purchasing their property. They were clearly overwhelmed with the task of establishing and operating a poly-culture farm, organizing the business-side of the farm, raising a young child, complying with local building regulations and applying for farm support programs. For instance, although their business model depended on direct sales from the farm, their farm was far from town and lacked road signage. Although their farm was productive, oversights such as signage could lead to significant losses.

### *Farm Education Programs*

There is a wide range of agriculture training programs available for all age-levels and skill types of new farmers. Due to space restraints, only some of the successful programs taking place in B.C.'s public education system will be discussed, including a review of four specific successful farm-training programs mentioned in the interview process.

Across North America, innovative teachers and public schools have implemented successful farm education programs.<sup>191</sup> British Columbia has made some progress with the "Fields For Your Future" program offered to primary and secondary students through BC Agriculture In The Classroom Foundation (BCAITCF) funding. The BCAITCF offers farm education packages for teachers and has helped fund a number of community gardens at schools around B.C. The University of British Columbia's 'UBC Farm' also provides numerous farm education programs that could be used as a model for schools across the province.<sup>192</sup> To help expand these programs, the Ministry of Education and Ministry of Agriculture could collaborate to develop an action plan to include agriculture lessons at each grade level and establish a community garden at schools across the

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<sup>191</sup> For example, the Growing Minds – Farm to School program in the United States works with 9000 schools in 50 states to provide agriculture lessons, and provides free lesson plans to elementary and middle school teachers on subjects such as pressing apple juice, making simple yogurt, growing vegetables and cooking. Appalachian Sustainable Agriculture Project, "Growing Minds: Farm to School Program." <http://growing-minds.org>

<sup>192</sup> The University of British Columbia's Farm School has developed a program called "FarmWonders Children's Programs" that provides a wide range of agriculture course to all ages of school children. They also offer spring and summer camps. Other post-secondary institutions around the province could easily adopt this model. University of British Columbia, Centre for Sustainable Food System's at the UBC Farm, "FarmWonders Children's Program." <http://ubcfarm.ubc.ca/community/childrens-programs/farmwonders/> (Accessed March 15, 2012).

province.

There are many opportunities to train new farmers at B.C.'s post-secondary institutions as well. Some institutions, such as Kwantlen Polytechnic, have already developed agriculture programs. While Kwantlen's Farm School offers both a diploma and a degree program, students can benefit from taking single classes or extra-curricular workshops on food production. Farmer # 6 had recently completed an agriculture diploma at Kwantlen, and spoke highly of the program and of the apprenticeship program offered to graduates. Kwantlen owns a large community farm that they lease to recent graduates for up to three years to help get them started. Despite this training, Farmer #6 noted he had ruined many crops in his first year by spreading unprocessed mushroom manure over the seed-starts. Problems like this were very common with all farmers.

The University of the Fraser Valley (UFV) also offers a strong agriculture program aimed primarily at larger-scale production and livestock management. The UFV is in the process of building a new Centre for Excellence farm school that will be complete in 2014. The UFV's experience developing a productive farm school could be used to help develop similar programs at other regional institutions.

Despite Kwantlen and UFV's success, these schools are both located in the lower mainland. Most other post-secondary institutions around B.C. do not offer such programs. This adds costs for students who must relocate to attend these schools. Although students interested in agriculture careers can attend an agriculture-focused institution (e.g. Kwantlen), other students who want basic knowledge on food production, in addition to their regular degree, miss this opportunity. For example, the University of Victoria, B.C.'s third largest university and home to a strong environmental movement, does not have an agriculture program, despite ample land for such a program. A provincial strategy to ensure that post-secondary institutions offer agricultural courses can help more students develop basic agricultural training. This can provide momentum to help students grow their own food, or start a small farm.

#### *Extension Agents and Farm Reviews*

Multiple farmers stressed the benefits of government-funded extension agents that can provide information on small-scale or organic production. The importance of

new extension services is also commonly noted in government documents, such as the B.C. Agriculture Plan.<sup>193</sup> Farmer #10 said that one of the biggest setbacks they encountered was when their organic extension agent, who helped research and answer questions about organic farming, lost her funding. The agent was on a three-year contract from the B.C. Ministry of Agriculture, and assisted organic farmers across the province via telephone and e-mail between 2007 and 2010:

One thing I think is criminal, is that there are no extension agents to help farmers with organic information. We could call her with any question, on any input, and she would find an answer for us. As farmers, there is Google, but we don't have time. We need to be farming. For more and more of our job, we have to research to find what's available, where it is available, and what has worked for others in similar regions. It really helped to have someone to help with the legwork.

Extension agents help farmers answer questions on pesticide and fertilizer alternatives, growing techniques, crop varieties, and disease outbreaks. Farmer #10 stated that this service is absolutely integral to new farmers. Without extension agents, there is no support to address the steep learning curve. Farmer #10 discussed how difficult it was to start a new farm, and how many young people they meet are overwhelmed by the challenge: “We were a business just like anybody else,” they said. “We were completely on our own with no help.” If new extension agents were based in existing Ministry offices, this program could be expanded and the only expense to government would be salary costs. There may also be opportunities to hire experienced farmers to provide part-time extension services, which could provide them with an additional source of income.

Government extension agents could provide advice on purchasing or leasing property, business planning, marketing, obtaining grants, or legal issues. The B.C. government currently provides a dedicated “major investment office” within the Ministry of Jobs, Tourism and Innovation to help major foreign investors operate in B.C.; some of this funding could be used to help develop small-scale agriculture in B.C.<sup>194</sup>

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<sup>193</sup> British Columbia, Ministry of Agriculture, “The British Columbia Agriculture Plan: Growing a Healthy future for BC Families,” Victoria, B.C.: Government of British Columbia, 2010, 27.

<sup>194</sup> British Columbia. Ministry of Jobs, Tourism and Skills Training. “Major Investments Office.” <http://www.britishcolumbia.ca/invest/our-services/major-investments-office.aspx> (Accessed June 12, 2014)

### *Farm Mentorship Programs*

Numerous farmers also mentioned farm mentorship programs as an effective and low-cost method of training new farmers. A mentorship program works by connecting an experienced farmer with a new farmer for a certain period (usually an entire growing season). Currently, the B.C. Ministry of Agriculture does not offer a formal mentorship program. In its absence, a number of farm organizations, such as the Young Agrarians, are offering such programs. The Young Agrarians mentorship program (“Business Mentorship Network”) is funded by grants from Vancouver City Credit Union and the Investment Agriculture Foundation of British Columbia. The program is free to users, although they must do community service on behalf of the Young Agrarians as payment (e.g. host events on their farm, or write blog posts). Mentors get an hourly wage, up to forty hours. Farmer # 7 was involved in the Young Agrarian mentorship program at the time of our interview, while Farmer #6 was trying to get access to a mentor for his farm.

The Province could provide additional funding to organizations like the Young Agrarians to expand farm mentorship programs. Alternatively, this could be a province-wide program offered by the Province. Mentorships offer a low-cost method of providing individualized training to new farmers. These programs would require oversight to ensure mentors are adequately qualified, participants were willing to utilize the services, and funding was not abused.

### *Environmental Farm Plan program*

A number of farmers interviewed discussed the educational benefits they received from the Environmental Farm Plan (EFP) program. This provincially funded program helps farms create a plan to increase their overall sustainability. A free farm inspection identifies beneficial management practices (BMPs) that a farmer can improve to increase the farm’s sustainability. In 2006, a review of the program confirmed that 90% of participants had made at least one beneficial management practice (BMP) recommended by their EFP and 50% of farms in Ontario and Quebec (the provinces that first

implemented the program) had completed all their BMP recommendations.<sup>195</sup> The positive results of the program for Farmer #9 were clear:

The EFP program was very good because it forced us to take a microscope to our farm operation. The woman was well trained, and walked us through multiple parts of the farm. She showed us how our compost was leaching into the water supply and potentially harming other areas of the farm. The financial consultant looked at our financial plan, and helped us receive subsidies to build a well and a deer fence. An engineer who knew about agriculture and irrigation helped us build a water system that was more sustainable. It was all very organized, and it was free at the time.

Programs such as the EFP are an effective way to educate both new and experienced farmers on new farm and business techniques. Furthermore, the BCAC suggests that EFPs are particularly useful for smaller farmers that sell directly to customers: “B.C. farmers who sell directly to the public are most likely to engage with the program, because sustainable farm practice – like organic certification – is a selling point for their customers.”<sup>196</sup> In addition to training for farmers, the EFP can help consumers identify products produced using sustainable practices. The EFP is administered through Growing Forward, a partnership with the federal government; British Columbia could expand this program with more funding.

### *Transition Programs*

Career-transition programs offer another effective tool to encourage people new farmers. Career-transition programs help workers exit out-dated industries and enter agriculture. Transition programs can take many shapes, but usually combine funding for temporary living expenses (unemployment insurance) with education opportunities. Other programs simply offer education grants or subsidized education programs.

Farmer #10 provides a strong example of the importance of transition programs. This farmer left the fishing industry in the late 1980s when the industry was collapsing from overfishing. At that time, a government transition program provided him the

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<sup>195</sup> Government of Canada, Agriculture and AgriFood Canada, “Environmental Farm Planning in Canada: a 2006 overview.” Ottawa: Government of Canada, 2012.  
[http://publications.gc.ca/collections/collection\\_2011/agr/A125-15-2011-eng.pdf](http://publications.gc.ca/collections/collection_2011/agr/A125-15-2011-eng.pdf)

<sup>196</sup> Randy Shore, “B.C. Farmers less likely to join environmental farm plan,” *The Vancouver Sun*, <http://www.vancouversun.com/farmers+less+likely+join+environmental+farm+plan/9034425/story.html>

temporary funding and training required to leave commercial fishing and start a farm. His knowledge of sustainable food production, combined with his hands-on skills, made him an excellent new farmer. He has now been producing food for 20 years. As there are many ways to utilize transition programs, tax credits, and subsidized training, British Columbia should explore how these programs can help increase the number of farmers in the province.

## **Conclusion**

This chapter discussed four key policy-reform areas that can help strengthen local food economies and expand small-scale agriculture in B.C. This review is based primarily on ideas gathered from interviews with a small sample of B.C. farmers, and is by no means intended to be a comprehensive policy analysis. Many other policy changes to increase agricultural resilience were not discussed here, such as ways to directly reduce agricultural emissions (e.g. solutions for the dairy industry) or water management solutions. British Columbia can work with other research institutions to develop the evidence base necessary to both understand how emissions are created at different stages of the food production change and to provide better models for future climate scenarios.

Although the findings of climate science clearly imply that B.C. should make changes to its food system, there are many significant challenges to successful policy reform. The current food system is composed of thousands of established businesses and interest groups, many who have invested heavily in current production methods and profit from it. Although some of these actors may support pro-resilience policies, they will want to ensure that sudden policy changes or regulatory requirements will not impact their profitability or business model. In many cases, policy reform will directly threaten these industries. All future policy changes should understand and anticipate the challenges associated with resilience-focused reform. The following two chapters in this thesis will explore the challenges with pursuing agricultural reform, and will discuss some of the key allies that policy makers should look to for support.

## **CHAPTER 6 – Reforming British Columbia’s Food System: Obstacles and Opportunities.**

The previous four chapters have argued that British Columbia can increase the climate-resilience of its food system by expanding small-scale agriculture and strengthening local food systems. As the agricultural requirements of different regions vary greatly according to geographical, ecological, and social characteristics, interviews were conducted with a variety of small-scale farmers in B.C. to understand better the policies that these farmers believed could encourage local food production in the small-scale farm sector in B.C. While on-farm perspectives provide a valuable lens, they should also be examined within the complex political and economic environment that impacts public policy. Countless variables, both predictable and unpredictable, govern the success or failure of policy making. Policy makers, governments, and resilience advocates should understand these forces to focus on policies with the best chance of success.

This chapter will analyze the key political and bureaucratic variables that will impact implementation of the policies discussed in chapter four. This analysis will focus both on forces that will create obstacles to new policies (e.g. free-trade agreements that promote an export-oriented food system), and on opportunities to provide support for pro-resilience policies (e.g. growing public support for local food). This analysis will then be used to assess the political do-ability of the policy ideas in chapter 4. Specifically, the tables at the end of chapter five will review each of the suggested policies in the context of the expected obstacles and opportunities. These tables are broadly organized based on the expected political do-ability of each idea, with the most do-able policies listed first, and the most difficult last.

This list is only intended to establish general parameters. Due to the many unforeseen variables that impact policy making, including election cycles, the global economy, and policy timing, it is difficult to predict policy success or failure accurately. Politicians spend much time anticipating individual, community, and business reactions to policy change and misread social cues are common.

The following analysis will begin by exploring the history and current influence of

Canada's industrial export-oriented agriculture economy. This productive system plays a major role in influencing agriculture policy in Canada and is the primary benefactor of existing agriculture policies and subsidies. This thesis explores the various supports for this system, coming often at the expense of small-scale agriculture and local food economies, and challenging expansion of the small-scale sector. This discussion will also review the impact of agricultural interest groups, policy legacies (past policies that lock-in support for this system), including the impact of free-trade agreements and land-development pressures.

Despite the strength of the industrial food economy, this chapter reviews the broad and growing movement of sustainable agriculture advocates, including farm organizations, municipal governments, consumers and businesses that will support the small-scale sector through financial support, research, and advocacy. It also reviews the innovative advocacy work being done by grassroots farm organizations like FarmFolk/CityFolk and the Young Agrarians, and discusses some organizational challenges small-scale advocates face. Some of these perspectives emerged in interviews, as many farmers were actively involved in efforts to expand local agriculture.

Lastly, this chapter analyzes some of the bureaucratic challenges that will impact policy creation, including the sometimes challenging relationship between provincial and local governments, and the bureaucratic challenges (e.g. implementation and administration issues) that complicate policy making. This review will also touch on the financial challenges associated with policies and programs administered by provincial and local governments, including the impact of strict budgetary conditions.

### **The Growth and Influence of International Agriculture**

Agriculture policy Canada-wide and in British Columbia is heavily influenced by large-scale and export-oriented agriculture and the international agriculture economy that provides a majority of current food supply in B.C.. The reasons are two-fold. First, large-scale production covers a significant portion of Canada's food production and agricultural activity. Second, many policies created to aid large-scale production are still in place, providing ongoing support and incentives. This section will review the main policies that support large-scale production, and the impact this has the small-scale

sector.

The role of past policies in locking-in previous policy goals (e.g. increasing farm size to take advantage of increased economies of scale) and setting agriculture policy is significant. This phenomenon is often referred to as “path dependency.” Paul Pierson summarizes the concept: “The idea of path dependency is that once a particular course of action has been chosen, it becomes increasingly difficult over time to reverse that course of action.”<sup>197</sup> Margaret Levi suggests that “Once a country or region has started down a track, the costs of reversal are very high. There will be other choice points, but the entrenchments of certain institutional arrangements obstruct an easy reversal of the initial choice.”<sup>198</sup> Path dependency derived from certain institutional and transaction-cost literatures, and provides a valuable lens through which to understand how past agriculture policies help “lock-in” a less-resilient food economy. The central argument of path dependency theory is that actors within a system rely heavily on existing systemic frameworks, creating significant pressure to maintain the status quo, and making new policy paradigms difficult to pursue, such as a transition to climate resilient agriculture. As large-scale agriculture and international trade are heavily entrenched in Canada, path dependency suggests that it will be difficult to shift support (e.g. subsidies programs, trade agreements) away from this sector towards more resilient alternatives.

Grace Skogstad’s research on the evolution of Canadian agriculture highlights governments’ integral role in “locking in” the modern food economy. Governments helped create the industrial agriculture economy to achieve previous goals (e.g. increased production). Crucially, the policy legacies from this create ongoing structural advantages for large-scale agriculture. Governments therefore have a responsibility to re-shape this sector to confront modern problems, such as climate change.

Beginning in the 1940s, advances in farm technology allowed for the well-documented erosion of traditional family farm. These farms were gradually replaced by

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<sup>197</sup> Paul Pierson, “Increasing Returns, Path Dependence, and the Study of Politics,” *American Political Science Review* 94, no.2 (2000): 251.

<sup>198</sup> Margaret Levi, “A model, a method, and a map: rational choice in comparative and historical analysis,” in *Comparative Politics: Rationality, Culture and Structure*, ed. Mark I Lichbach and Alan S Zuckerman. (Cambridge: Cambridge University Press, 1997), 27.

larger, more industrialized alternatives, in an effort to increase output drastically. As the transition to bigger farms took place across Canada and the United States, agriculture policy shifted to support and promote the new agricultural model. Skogstad documents federal support for the expansion of Canadian agriculture, which was based on the shift to large-scale, mechanized production. This was done with federal guidance and subsidization:

[The Canadian government] subsidized credit to encourage farmers to expand the size of their farm unit, invest in machinery in order to reduce the amount of labour needed, and increase the productivity through greater use of chemical fertilizers and herbicides.<sup>199</sup>

Government assistance for large-scale agriculture was coordinated by an organized farm lobby, which enjoyed close relationships with Ottawa.<sup>200</sup> The impacts of these policies led to a major reduction in the number of Canadian farms, from approximately 750,000 in 1941 to 250,000 in 2001, and a corresponding increase in the average size of Canadian farms, from 250 acres in 1941 to 675 acres in 2001.<sup>201</sup>

The state-assisted agriculture model flourished throughout the 1960s and 1970s, but began to wind down in the 1980s, amidst shrinking federal budgets and globalization. At this point, much Canadian agriculture moved towards a more globalized, export-oriented model, although supply management limited this transition for certain industries (e.g. dairy). This forced many farms to grow even bigger to take advantage of greater economies of scale to compete with international competitors.<sup>202</sup> As farms focused on exporting goods, international trade agreements began to change to support the export-focused production model.

Through the 1980s and 1990s, the scope of an internationalized food system was shaped by free trade agreements, including the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA). Although NAFTA was implemented primarily to benefit the manufacturing and natural resource industries, it had an

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<sup>199</sup> Grace Skogstad, *The Internationalization of Canadian Agriculture: Policy and Governing Paradigms*, (Toronto: University of Toronto Press, 2008), 49.

<sup>200</sup> Skogstad, *The Internationalization of Canadian Agriculture*, 55

<sup>201</sup> Skogstad, *The Internationalization of Canadian Agriculture*, 50.

<sup>202</sup> Skogstad, *The Internationalization of Canadian Agriculture*, 59.

immediate effect on agricultural production by flooding the Canadian market with heavily subsidized American farm goods, and pressuring Canadian producers to re-orient to exports. For example, over the first eight years that NAFTA was implemented, US agriculture exports to Canada increased by 59%, while Canadian and Mexican exports to the USA increased by 86% percent.<sup>203</sup>

While NAFTA undoubtedly helped reduce some food costs, it had a lasting negative impact on local and small-scale food producers who struggled to compete with large-scale counterparts. The impact of NAFTA on small-scale farmers is apparent in the cases of small-scale Mexican corn growers who were undercut by subsidized American corn. American corn exports increased by over 400% between 1992 and 2005, while corn prices dropped 66% in Mexico during this time.<sup>204</sup>

Similar results took place in British Columbia as previously mentioned in my interview with the brothers at Farm #3. Throughout the 1990s and 2000s, this farmer operated 55 acres of conventional apple orchards in the Okanagan Valley. They told me how the introduction of NAFTA in the mid-1990s led to drastic swings in the annual prices of apples, which made it very difficult operate their business. When USA producers had good years, prices in B.C. would plummet. In 2004, huge production increases on American apple farms, coupled with good weather, flooded the B.C. market with low-cost apples and the two brothers at Farm #3 could not afford to maintain their land leases. They lost their leases and focused on turning their family's smaller apple orchard into a diverse certified-organic farm, in hopes of greater financial stability. As the brothers at Farm #3 farmed land that was primarily within town boundaries, many of their previous rental plots had been sold off and developed into housing (their current farm was surrounded by housing).

Farmer #4 echoed similar feelings about current problems due to the free flow of

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<sup>203</sup> Zahniser, Steven, and John Link. "Effects of North American Free Trade Agreement on Agriculture and the Rural Economy." Report prepared for the USA Department of Agriculture. Washington DC: US Government Printing Office, 2002, 10-12.

<sup>204</sup> Wise, Timothy A. "The Impacts of US Agriculture Policies on Mexican Producers, Mexican Rural Development Research Report." Paper prepared for the Woodrow Wilson International Center for Scholars, 2010, 7, [http://www.wilsoncenter.org/sites/default/files/Subsidizing\\_Inequality\\_Ch\\_8\\_Wise.pdf](http://www.wilsoncenter.org/sites/default/files/Subsidizing_Inequality_Ch_8_Wise.pdf)

goods into B.C. from larger agriculture regions:

In our industry, Washington State is our biggest competitor. They are huge. They are a world leader in tree fruits. Land there is \$10,000 an acre for prime land, while it's \$100,000 an acre here. A lot of farmers here are having a tough go of it. I can only do it because my family owns the land. This year, for example, is going to be a disaster for apple farmers. Washington State is on track for 150 million boxes of apples, and we know that anytime they are over 120 million boxes, prices in B.C. are a disaster as we have to price match them locally. If the next two years are like this, I won't be farming.

While consumers prefer them, lower produce prices may reduce incentives to enter farming, or make it more difficult for farms to survive. This financial pressure notably encourages governments to maintain the major support programs (discussed later) for large-scale production to keep them competitive internationally. Subsidies for large-scale agriculture are well-documented internationally, and may come at the cost of financial support for small-scale production.<sup>205</sup> Governments will struggle to shift scarce subsidy funding towards resilient alternatives without harming these producers.

Most recently, the Canadian government has signed free-trade agreements with lower-cost countries such as Columbia, Honduras, Panama, Peru and Jordan. In 2014, Ottawa announced a nearly-finalized free-trade deal with the European Union. This Comprehensive Economic and Trade Agreement (CETA) with the EU will further “internationalize” Canadian agriculture, and may further pressure Canadian agriculture, including more financial instability for smaller farms.

Skogstad's research suggests that these international agreements help lock in policy support for large-scale and export-oriented agriculture:

The restructuring of the agriculture and food supply systems and the processes of economic globalization that are contributing to it have implications for policy paradigms in agriculture. They do so because economic globalization requires states to give heightened attention to competitiveness concerns, that is, the ability to maintain and increase market share in domestic and foreign markets.<sup>206</sup>

Free-trade agreements impact all aspects of the Canadian economy, which makes these

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<sup>205</sup> Timothy Wise, “The Paradox of Agriculture Subsidies: Measurement Issues, Agricultural Dumping and Policy Reform, paper prepared for the *Global Development and Environment Institute*, Tufts University, February 2004.

<sup>206</sup> Skogstad, *The Internationalization of Canadian Agriculture*, 19.

agreements very difficult to negotiate, implement and rescind. Once implemented, businesses have the economic stability required to invest into new production models (e.g. equipment required for large scale production). These investments create financial dependence on the free-trade relationships, furthering pressure to maintain the agreements. Furthermore, free-trade agreements limit a country's ability to set domestic legislative agendas; for example, Chapter 11 of NAFTA allows foreign businesses to sue the Canadian government for policies that impact them negatively.<sup>207</sup>

Some local-food advocates, including several farmers interviewed, agree with Thomas Pawlick that we should “renegotiate NAFTA to remove provisions that threaten or damage small farms and small rural business.” While their end-goal is admirable, few precedents suggest this reform is likely in the near future. Additionally, it is very difficult to determine whether rescinding or re-negotiating free-trade policies will automatically make British Columbia's food system more resilient. It is possible that a short-term drop in imports, coupled with increases in prices for farm machinery and equipment, or other goods could reduce resilience.

Instead of spending political capital negotiating international trade agreements, governments could benefit more by focusing on domestic policies that can increase resilience without triggering international legal problems. For example, policies that focus on farmland preservation, especially in urban regions, coupled with infrastructure-support programs and consumer-education programs can help develop local food economies without directly challenging the entrenched policies that support the export-oriented economy. Land-lease programs that encourage new farmers to take up farming offer another method to increase production without spending political and economic capital trying to repeal deeply entrenched policies.

#### *Support Programs and Subsidies for Industrial Agriculture*

In addition to free-trade agreements, many agriculture support programs and subsidies help “lock in” large-scale production at the expense of local food systems. These subsidy programs are heavily entrenched in Canada and will be difficult to reform.

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<sup>207</sup> Sanford E. Gaines, “NAFTA Chapter 11 as a Challenge to Environmental Law Making – One View from the United States,” paper presented at the first annual EnriReform Conference, Toronto, University of Toronto, November 16-18, 2000.

Estimates show that the federal and provincial governments currently spend approximately eight billion dollars per year on agriculture in Canada.<sup>208</sup> Statistics Canada data shows the federal government spend over 2.3 billion on direct agriculture subsidies in 2011. Of the sixteen farmers interviewed, only two (both of the apple producers) had utilized any of the subsidy programs discussed below. Small-scale or polyculture farmers rarely take advantage of these programs, for multiple reasons that are discussed later.

Most of this subsidization comes through the AgriInvest and AgriStability programs, and the Canadian Agricultural Income Stabilization (CAIS) program. The AgriInvest program allows farmers to save 1.5% of their annual income to make up for future income shortfalls; the federal government matches each annual contribution up to \$22,500.<sup>209</sup> Federal payments for 2011 were \$424 million. AgriStability is a whole-farm, margin-based program that allows producers to protect their farm operations against large declines in farm income. A program payment is triggered when a producer's annual margin (allowable revenue less allowable expenses) drops below their average margin from previous years. Prior to changes in 2013, a payment was triggered when the producer's margin fell below 85% of the average. Now the trigger will be 70%.<sup>210</sup> In 2011, AgriStability payments totalled \$740 million<sup>211</sup>

In addition to these programs, the federal government paid out \$1.3 billion in crop insurance payments in 2011, and \$316 million to the AgriRecovery program, which pays money to farmers who experience a natural disaster such as extreme weather, diseases, or pests.<sup>212</sup> AgriRecovery payments could easily increase with future climate problems. Each year, the federal government also provides ad hoc assistance to farmers based on current needs. In 2004, Ottawa provided \$430 million to assist with the bovine spongiform losses; most of this money went to Alberta farmers where the problem

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<sup>208</sup> Paul Waldie, "The growing problem: Canada slips from agricultural superpower status," *The Globe and Mail*, November 23, 2010. <http://www.theglobeandmail.com/news/national/time-to-lead/the-growing-problem-canada-slips-from-agricultural-superpower-status/article1316188/>

<sup>209</sup> Canada. Agriculture and Agri-Food Canada. "AgriInvest Program" <http://www.agr.gc.ca/eng/?id=1291906709089> (Accessed March 4, 2014).

<sup>210</sup> Canada. Agriculture and Agri-Food Canada. "Growing Forward 2" <http://www.agr.gc.ca/eng/?id=1398198173518> (Accessed March 4, 2014).

<sup>211</sup> Canada, Statistics Canada, *Direct payments to agriculture producers - Agriculture economic statistics — 2011*, Table 1-31. Ottawa, 2012. <http://www.statcan.gc.ca/pub/21-015-x/2012001/t032-eng.pdf>

<sup>212</sup> Ibid.

originated. In 2005, the ad hoc Farm Income Payment Program offered a one-year sum of \$1.1 billion towards further restructuring in the farm economy towards the international economy. Another 2006 subsidy worth \$550 million, a campaign promise of the 2006 Conservative government, was aimed at defraying “rising input (fuel, fertilizer) costs.”<sup>213</sup> Industrial agriculture will likely require more funding in the future to deal with emissions reduction challenges, rising fuel prices, and climate threats; governments must decide at what point they will stop increasing funds to this sector.

Skogstad’s research indicates that Canada’s largest farms received the largest portion of this funding.<sup>214</sup> Large mono-crop producers can calculate yearly farm revenues more readily, as a single market price is relatively simple to track; small, diversified producers must calculate complex bi-weekly farmers’ market sales. Furthermore, the large insurance payments received by large producers make it worthwhile for these growers to pay insurance deductibles and invest time applying for insurance rebates and subsidy programs. Many small-scale farmers are simply too busy farming and selling food to deal with the paperwork burden of multiple insurance programs, in addition to the other office work surrounding safety regulations and municipal by-laws. The challenges associated with paperwork and complex government insurance programs were common themes in the interview process.

### *Financial Legacies*

In addition to the policy legacies discussed above, Canada’s export oriented food system and the broader international agriculture economy are further locked-in by the significant financial investments made by all businesses involved in this economy, including farmers, producers, and retailers. This includes the expensive equipment purchased by farmers, production facilities purchased by manufacturers, and retail space and equipment purchased by retailers such as Sobeys or Walmart. All of these businesses likely made these investments on the assumption that the current food model would continue to expand and remain profitable. Food retailers will surely resist any policy

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<sup>213</sup> This program was the Canadian Farm Families Options Program, announced by Stephen Harper’s Conservative Party in the lead up to the 2006 election. Skogstad, *The Internationalization of Canadian Agriculture*, 102.

<sup>214</sup> Skogstad, *The Internationalization of Canadian Agriculture*, 104.

reform ideas that limit their ability to profit from high-markup products such as imported, non-seasonal and heavily manufactured food products. Shareholders of large agribusinesses such as Monsanto, Potash Corporation of Saskatchewan, Deere and Company and Archer Daniel Midlands Company, all of which have a value of over \$20 billion dollars, expect regular share increases and dividend payments. These investments impact a broad range of Canadians through public pension funds or as individual investors.

Jeremy Wilson quotes Paul Pierson to highlight financial investments' contribution to the path dependency of outdated and unsustainable production models. While this research involves B.C.'s forestry sector, similar financial investments take place within the food system:

‘Lock-in’ is particularly likely Pierson argues where policy decisions generate ‘sunk costs,’ that is, where they encourage investments that cannot be easily reversed: ‘Policies may create incentives that encourage the emergence of elaborate social and economic networks, greatly increasing the cost of adopting once-possible alternatives and inhibiting exit from a current policy path. Major policy initiatives have major social consequences. Individuals make important commitments in response to certain types of government action. These commitments, in turn, may vastly increase the disruption cause by new policies, effectively “locking in” previous decisions.’<sup>215</sup>

The lock-in created by financial pressures is particularly powerful in agriculture where small and large-scale farmers rely on large mortgages to purchase land, equipment, processing facilities and production quotas. For example, farmers who have made significant investments into the planting and harvesting equipment for large-scale, intensive production are unable to switch to poly-culture or low-till farming methods as this will likely result in lower income and higher chances of defaulting on loans. These “sunk costs” also reflect the lack of flexibility associated with certain models of production (in this case, large-scale agriculture), as discussed in chapter 3. By comparison, many of the small-scale growers interviewed, particularly those on leased-land, had minimal sunk costs and could quickly move or transform their farm operation when necessary. This was particularly true for farmer #8, who grew in containers on fork-lift pads, and could move their farm whenever cheaper lease plots became available.

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<sup>215</sup> Jeremy Wilson, *Talk and Log: Wilderness Politics in B.C.*, (Vancouver: UBC Press, 1998), 48.

## Policy Opportunities and the Local Food Movement

While the previous section highlighted the political power associated with large-scale agriculture and the international food economy, including the ways this system has entrenched itself in Canada, this does not necessarily mean that it will be impossible to develop a more resilient alternative. Opposition to the industrial food system is long-standing, and can be partially traced to the beginnings of the organic agriculture movement in the early 20<sup>th</sup> century.<sup>216</sup> The counterculture movements in the 1960s and 1970s further expanded the popularity of alternative agriculture systems. Keupper summarizes Polan's review of organic agriculture's and local food's growing popularity:

He [Polan] writes that there are three pillars or legs to the counterculture vision of organic. The first pillar is environmentally sound farming without the use of synthetics, to produce high quality, safe food. The second is alternative food distribution system with few middlemen. One bought organic food either directly from the grower or from food cooperatives, buying clubs, or health food stores – never from “industrial food” supermarkets. Last of all, organic food meant whole, fresh food, with minimal processing and no artificial ingredients – “counter cuisine” for the “counterculture.”<sup>217</sup>

The rise of the organic agriculture movement was followed by the more recent revitalization of the local food movement. The growth in local food economies and the shifting preference for locally produced food is most clearly displayed in the expansion of farm markets in B.C. and throughout North America. As previously mentioned, economic activity at farmers markets grew an estimated 147% in B.C. between 2006 and 2012, and the number of markets increased 62%.<sup>218</sup> These statistics parallel American numbers, where local food systems have rapidly expanded.<sup>219</sup> One study on local agriculture highlighted the primary reasons consumers are shifting towards local foods, including: increased freshness, the desire to support the local economy, and understanding where

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<sup>216</sup> One of the initial reasons for the popularity of organic agriculture was due to skepticism over the chemicals that were starting to be used on farms, especially large-scale operations that needed these chemicals to control mono-crop production. George Kuepper, “A Brief Overview of the History and Philosophy of Organic Agriculture,” paper prepared for the *Kerr Centre for Sustainable Agriculture*, 2010, <http://kerrcenter.com/wp-content/uploads/2014/08/organic-philosophy-report.pdf>

<sup>217</sup> Ibid.

<sup>218</sup> Morton, “Farmers markets flourishing across B.C. as more buyer's go local.”

<sup>219</sup> Rich Pirog, “The Local Food Movement: Setting the Stage for Good Food,” paper prepared for the *MSU Centre for Regional Food Systems*, 2014. [http://foodsystems.msu.edu/uploads/files/Local\\_Food\\_Movement.pdf](http://foodsystems.msu.edu/uploads/files/Local_Food_Movement.pdf)

and how food was produced.<sup>220</sup> Many of these positive attributes, in addition to the resilience of strong local food systems, were noted in my interviews as reasons for purchasing locally produced goods.

In addition to the expanding consumer support, the local food movement and small-scale agriculture are supported by a broad and growing array of advocacy organizations, businesses, and local governments that can attract government support for the sector. These actors play an important organizing role in the local food movement; currently, they are helping to organize farmers; share knowledge; build connections between farmers, businesses and governments; and develop programs and policies that can help the industry. During the interview process, numerous farmers mentioned the positive impact of grassroots organizations such as FarmFolk/CityFolk, the Young Agrarians, and The Land Conservancy for their farm or for the local agriculture community in their region.

Grassroots organizations like FarmFolk/CityFolk (FFCF) currently provide numerous services to farmers that are not offered by governments or traditional farm organizations (e.g. the BC Agriculture Council) due to the more rigid bureaucratic requirements of larger organizations. For example, FFCF currently operates a number of local food projects, including the “Seed Security Project,” dedicated to restoring heritage seed varieties; the “Farm Product Distribution” project, which operates an online hub to connect commercial buyers to local farmers; the “Foodlands Trust Project,” which is researching governance and financial structures for holding usable farmland in trust; and the “Local Food MicroLoan Program”, which partners with banks to provide loans to small-farmers and producers.<sup>221</sup>

Similarly, Young Agrarians’ programs including the farm mentorship program previously discussed, land-access tools to help new farmers find land, job boards for farm apprenticeship programs, and the “U-Map” program which is an information hub on small-scale farm techniques. Both of these organizations also offer extensive networking

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<sup>220</sup> Roslynn Brain, “The Local Food Movement: Definition, Benefits and Resources,” September 2012. [https://extension.usu.edu/files/publications/publication/sustainability\\_2012-09pr.pdf](https://extension.usu.edu/files/publications/publication/sustainability_2012-09pr.pdf)

<sup>221</sup> FarmFolk/City Folk, “Projects.” <http://www.farmfolkcityfolk.ca> (accessed February 14<sup>th</sup>, 2015).

events such as workshops, events, dinners, and active social media hubs.<sup>222</sup> The success of these organizations also shows the positive role that the internet and social media have in connecting small-scale farmers to better help share information and collaborate on advocacy issues.

Innovative projects to support local-food systems are also happening in the private sector. For example, the Vancouver City Credit Union (VanCity), which represents over 500,000 members, has been a strong supporter. VanCity provides three large, community grant funds, including the “enviroFund” program which has donated over \$5.7 million to community organizations, including large grants to BC Association of Farmer’s Markets and the Small-Scale Food Processors Association.<sup>223</sup> VanCity has also provided over 35 specific grants to help develop local and organic food businesses and associations in B.C. For example, VanCity provided \$175,000 in grant funding to Sole Food Street Farms, a business that grows and sells local and organic produce and provides employment and training in urban agriculture for residents of Vancouver’s Downtown Eastside. VanCity has also funded farm market development, community garden infrastructure, equipment purchases and repair for small-scale businesses, bikes for local food delivery companies, insulated local food delivery vehicles, and seed money to fund new community food organizations.<sup>224</sup>

The programs discussed above are valuable for two reasons: first, they help support small-scale farmers and local food systems<sup>225</sup>; second, they provide initial research, and program development that can later be used to implemented similar programs at the provincial level. For example, if the small-grant program offered by VanCity creates a successful template for lending money to small agriculture businesses, the Province could

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<sup>222</sup> The Young Agrarians Society, “Tools.” <http://youngagrarians.org/tools/> (accessed February 14, 2015).

<sup>223</sup> Vancouver City Credit Union. “EnviroFund Program,” 2014. [https://www.vancity.com/AboutVancity/InvestingInCommunities/Grants/enviroFund/?xid=about\\_megamenu\\_envirofund](https://www.vancity.com/AboutVancity/InvestingInCommunities/Grants/enviroFund/?xid=about_megamenu_envirofund) (Accessed July 15, 2014).

<sup>224</sup> Vancouver City Credit Union. “Investing in Communities,” 2014. [https://www.vancity.com/AboutVancity/InvestingInCommunities/StoriesOfImpact/Food/?xid=about\\_megamenu\\_local](https://www.vancity.com/AboutVancity/InvestingInCommunities/StoriesOfImpact/Food/?xid=about_megamenu_local) (Accessed July 15, 2014).

<sup>225</sup> The value of these services was clearly evident in my interviews, as numerous farmers had utilized the services offered by these organizations. As previously noted, farmers #6 and #7 had used the farm mentorship program offered by the Young Agrarians, and farmer #16 had used the land-access legal agreement offered by FarmFolk/CityFolk.

take over this service and provide additional funding. The major benefit of this is primarily the larger financial backing than the Province could provide. Alternatively, these services could continue to be offered through advocacy groups, with the Province providing extra staff or funding (e.g. grant money) to help grow the program or expand access. The Ministry of Agriculture should monitor these programs to determine if any of these programs could be implemented province-wide.

### *Organization Challenges for the Local Food Movement*

One of the biggest challenges for small-scale farmers and local food systems is finding ways to communicate their needs to policy makers and to effectively lobby governments for support. Small-scale farmers are far less organized than their large-scale counterparts when it comes to communicating effectively with policy makers. This is confirmed in research by Skogstad (discussed below), and through my interviews. Farm organizations play an important role in the policy process by bringing similar growers together to provide governments with specific policy or funding requirements. The leveraged power of farm organizations allow specific producer groups (for example, the BC Blueberry Growers Association, representing over 300 farmers in BC) to exert more unified sustained pressure on governments than individual growers.

British Columbia's most powerful farm organization is the British Columbia Agriculture Council (BCAC), which represents 14,000 BC farmers and 30 different farm organizations.<sup>226</sup> Other powerful groups include the BC Cattlemen's Association, which represent 1200 ranchers in the province, and the BC Greenhouse Growers Association, who represent 42 growers, 3200 employees and an estimated \$600 million in economic activity.<sup>227</sup> The significant economic activity that the members of these organizations provide to the provincial economy provides further incentive for governments to listen to their demands.

While farm organizations are an effective tool for communicating with governments, governments understandably tend to listen to the largest organization,

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<sup>226</sup> BC Agriculture Council, "About Us," <https://www.bcac.bc.ca/about-us> (Accessed July 28th, 2015).

<sup>227</sup> BC Greenhouse Grower's Association, "Quick Facts," [http://www.bcgreenhouse.ca/quick\\_facts.htm](http://www.bcgreenhouse.ca/quick_facts.htm) (Accessed July 28th, 2015)

and/or the organizations whose members contribute the most to provincial/federal economies. Large producer organizations can afford staff members to inform growers, help with paperwork, and lobby governments. For example, the BC Turkey Growers Organization has three permanent staff, in addition to 7 board members, that are responsible for research, information coordination, outreach and “political relations.”<sup>228</sup> The close ties between powerful farm organizations (and by nature, profitable growers) and governments contribute to lock-in policies that support these groups.<sup>229</sup> This bias makes it difficult for small farm organizations, or those representing pro-resilience policies, to communicate their needs.

The interviews confirmed that no significant lobby organizations in B.C. represent small-scale farmers. None of the small-scale polyculture growers interviewed were part of a broader farm organization that communicated their needs to government. At the time of my interview Farmer #13 was president of the Small Scale Food Producers Association. Although Farmer #13 farmed in the riding of the provincial Minister of Agriculture, the SSFPA had yet to arrange any meetings with provincial or federal agriculture ministers or policy planners, despite numerous attempts.

One of the primary organizational challenges for this sector is that small-scale farms are generally more diverse than large-scale counterparts, making it difficult to effectively communicate their needs in one powerful message. The interview process confirmed that diverse farming techniques (e.g. crops, production techniques, or sales methods) make it very difficult to find common policy requirements. For example, although land access is a pressing issue for new farmers, it would likely be more difficult for a diverse group of new farmers across the Province to organize and lobby governments, than it would be for greenhouse growers to deliver a unified message on creating a carbon tax rebate for farmers.<sup>230</sup>

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<sup>228</sup> B.C. Turkey Farmer’s Association, “Board Members and Directors.” <http://www.bcturkey.com/about/board-members-directors.aspx> (Accessed June 13, 2014)

<sup>229</sup> Skogstad, *The Internationalization of Canadian Agriculture*, 37.

<sup>230</sup> In 2012 the Greenhouse Growers Association were a key voice in lobbying the B.C. government to create a carbon tax rebate for farmers. This rebate primarily benefits large farmers who likely spend more on fuel costs. James Glave, “B.C. Carbon Tax Doesn’t Hurt Agricultural Sector: Study,” *The Huffington Post*, July 23, 2014. [http://www.huffingtonpost.ca/james-glave/bc-carbon-tax-doesnt-hurt-agricultural-sector-study\\_b\\_5611493.html](http://www.huffingtonpost.ca/james-glave/bc-carbon-tax-doesnt-hurt-agricultural-sector-study_b_5611493.html)

Diversity within the membership was evident in discussions with certified organic growers who belonged to the Certified Organic Association of British Columbia (COABC). Although the COABC represented many small farmers, a number of interviewees felt a single body could not effectively represent a diverse group of farmers:

The COABC needs to have a lot more power and clout. It needs to be one voice. There should be no ability for individuals to speak with government. If you want to speak with government, that will go through the COABC, period. The Agriculture Minister can't meet with all these people individually, hearing their own different spin. It is not optional, it has to happen. There needs to be a push for government to get them [the COABC] sorted out. You know, there are people in our body that want to fold COABC totally because their frustrated with it, I don't want any part of that. (Farmer #13)

Farmer #12 echoed similar problems with the COABC's ability to represent a diverse number of growers: "We have to start shooting inward, and we have to start shooting outward. We are working on the same goals, but we are so caught up in within our own group and trying to figure out what we want to achieve." Other farmers were simply too busy to make a time or financial commitment to a farm organization, and for others, the flexibility (e.g. no annual dues) of grassroots organization like FFCF or the Young Agrarians was a better option. As these organizations continue to grow, they may be able lobby governments more effectively alongside more established farm associations and industry groups.

### *Bureaucratic Challenges*

In addition to the organization challenges discussed above, the interviews also highlighted a general antipathy towards government support or participation in agricultural programs. For example, one of the key questions participants were asked was whether they had benefited or used government agriculture programs. For most, the answer was a clear no. The primary issue for small-scale mixed farmers is that participation in government programs (e.g. crop insurance) is time consuming, expensive, and difficult due to the diversity (e.g. number of crops) associated with polyculture. The most common problem raised during the interviews was the time it took to register for government programs and deal with the paperwork. For small farmers, most of their time is spent on the farm, selling goods, repairing equipment, or marketing; most do not have the funds to hire professionals to complete the paperwork for subsidy programs. For

example, insurance programs require a farmer to know exactly how much revenue they made from a certain crop to calculate present losses. This requirement also makes it difficult for new growers to apply for these programs.

Similarly, the costs associated with some programs, such as membership to the COABC (discussed in chapter 4: “It is expensive and complicated, costs about \$1800 a year and the paper work is insane, and anyone else can come in and say they are organic”) make it difficult for small farmers to take advantage of the programs offered by these organizations. Other programs, like the Environmental Farm Program, are far more worthwhile for farmers who own land (so they can take advantage of capital improvements) and have the capital available to make farm improvements. One partner at Farm #5 summarized the feelings of many farmers interviewed:

We looked into support programs, and thought about becoming certified, but there is simply too much paper work, and it cost too much money. If someone wants to see our farm, we have an open door. We can show them plants, sell them seeds, teach them about food preservation. We thought we might get some government subsidies to bring biodiversity back to the farm, but the rules are incredibly burdensome. We decided that it would be more trouble than its worth. We have so much on the go that we can't deal with all the paper work and regulations. All this bureaucratic process would kill us. It's almost impossible to use common sense without getting burdened by someone.”

Based on the information gathered in my interviews, there are currently no well-known or established programs that can help new farmers, or farmers on small-plot leased land. Although governments can support small-scale production and local-food systems in many ways, policy makers should recognize bureaucratic challenges that may limit participation. Programs that require high annual fees, one-time costs, or paperwork may not be broadly supported. It may be more beneficial to pursue options that do not rely on such complex requirements, such as farmland preservation policies, public education on local food, or funding for farm markets.

### **Government Funding and Provincial/Local Government Relations**

The final key political and economic issue that impacts agriculture policy in British Columbia are the financial limitations that both provincial and local government face. These impact their ability to raise revenue and increase spending. Both levels of

government face regulatory and political challenges that restrict modes of funding new agriculture policies and programs. Furthermore, many other services compete with agriculture for government funding. As governments look for new ways to both reduce GHG emissions and deal with the impacts of a changing climate, competition for scarce government dollars will likely strengthen. Policy makers should explore policy opportunities to increase local food production without high financial requirements. High-cost policy changes and programs are surely possible, but will face far greater political and economic obstacles.

Most provincial funding for agriculture comes through British Columbia's Ministry of Agriculture. A relatively small portion of the provincial budget pays Ministry staff and funds programs. Overall, funding for agriculture is significantly smaller than other program areas. For example, in 2014/2015 the Ministry of Agriculture was the third smallest Ministry (based on dollars), larger only than the Ministry of Energy and Mines and International Trade.<sup>231</sup> Agriculture received \$80 million dollars, while the Ministry of Natural Gas Development received \$401 million, Advanced Education received \$1.9 billion, Education received \$5.3 billion, and Health received \$16.9 billion dollars.<sup>232</sup> Over the next three years, the Ministry of Agriculture budget will only increase by \$1 million per year,<sup>233</sup> while the Ministry of Health's budget is expected to increase by over \$1.5 billion dollars between 2014 and 2017. This disparity clearly highlights the challenge that governments will have finding new money for agricultural programs. The 2014/2015 budget also promotes the \$9 million dollar carbon tax exemption created for farmers; as previously noted, none of the small-scale farmers interviewed mentioned this as a significant issue. It may instead benefit larger farmers with greater fuel costs.<sup>234</sup>

Although local governments play an important role in agriculture, their capacity to implement new policies and programs to support farming is constrained by financial pressures. Local government revenues are funded primarily through property taxes

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<sup>231</sup> British Columbia, Ministry of Finance, "BC Budget and Fiscal Plan, 2015" Victoria, B.C.: Government of British Columbia, 2006, 17. [http://www.bcbudget.gov.bc.ca/2015/bfp/2015\\_budget\\_and\\_fiscal\\_plan.pdf](http://www.bcbudget.gov.bc.ca/2015/bfp/2015_budget_and_fiscal_plan.pdf)

<sup>232</sup> Ibid.

<sup>233</sup> Ibid.

<sup>234</sup> BC Budget and Fiscal Plan, 104.

(generally 40-50% of revenue), and services charges such as water or sewer fees and recreation charges (generally 25-40% of revenue).<sup>235</sup> The remainder of local revenue comes primarily from developer charges, own-source revenue, and provincial transfers. The biggest expenses for local governments are police and fire services (approximately 20% of costs), and capital expenditures such as construction costs of physical assets (approximately 30% of costs).<sup>236</sup> Local governments also cover costs for parks and recreation, transportation and transit, water and sewer services, and waste management.<sup>237</sup>

Local government funding for agriculture must compete with funding requirements of other popular municipal services. Although residents may be supportive of local funding for agriculture, new funding will generally require service cuts in other areas, or new revenue streams, generally in the form of higher property taxes or services charges. Although increasing revenue is an option, tax or service charge increases are subject to intense political pressure (e.g. citizens may vote in politicians who promise to lower taxes), and research shows that excessively high taxation rates can have a negative impact on property values, and business investment.<sup>238</sup> Similarly, service charges (e.g. recreation rates) can only be increased a certain amount before citizens voluntarily stop using service.<sup>239</sup> In addition to revenue challenges, local government finances are often forced to comply with provincial regulations and oversight, which include ceilings on certain property tax levels and provincial audits. For example, in 2012 the provincial government created the Office of the Auditor General for Local Governments (AGLG) to audit municipal government finances and ensure citizens were getting “value for their money.”<sup>240</sup>

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<sup>235</sup> Robert L. Bish and Eric G. Clemens, “Local Government in British Columbia,” A report published by the *Union of British Columbia Municipalities*, Richmond, B.C., 2008, 187.

Rhttp://www.ubcm.ca/assets/library/Publications/Local-Government-in-British-Columbia/LGBC-All.pdf

<sup>236</sup> Local Government in British Columbia, 31.

<sup>237</sup> Ibid.

<sup>238</sup> Local Government in British Columbia, 194-197.

<sup>239</sup> Local Government in British Columbia, 179.

<sup>240</sup> British Columbia, Auditor General For Local Government, “Why the AGLG,” <http://www.aglg.ca/about-the-aglg/why-the-aglg.html?WT.svl=TopNav> (Accessed May 15<sup>th</sup>, 2015). And

Despite the financial limitations discussed above, certain opportunities exist with local governments (including financial opportunities) that may benefit agriculture and local food economies. As mentioned in the introduction, local governments provide an important role in policy creation. For example, local governments offer citizens the opportunity to become closely involved in decision making, both through getting involved in local politics, and through the unique role that voluntary organizations, neighbourhood associations and community clubs play in guiding local government policy.<sup>241</sup> Therefore, if citizens have a strong desire to promote farming and local food systems, they may have an easier time achieving this at the local level. This is true with local governments like Vancouver or Saanich, who have been strong supporters of local food and implemented progressive policies such as Vancouver's community garden network, or Haliburton farms in Saanich. In this way, local governments act as a testing-ground for agriculture policies to determine if they provide value, at which point they may be implemented on a wider scale – either by another municipality, or Province-wide.

Within strict local government budgets, local support for agriculture can also benefit from unique funding scenarios, including conditional provincial grants and cost-sharing programs. The provincial government has a long history of providing local governments with conditional grants to support urgent policy goals, or policies with a provincial interest.<sup>242</sup> Traditionally, the Province provides grants to local governments to help with infrastructure costs, such as growth management, underground utilities, water and sewer. More recently, the Province has developed new grant programs to specifically help local governments “promote environmental sustainability and healthier communities.”<sup>243</sup> Key programs that have been used for environmental purpose include the Canada-BC Municipal Rural Infrastructure Fund, Towns For Tomorrow, BC Spirit Squares Program, and the Green Cities Awards. Although these grants (listed above)

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Lindsay Kines, “B.C.’s municipal auditor general office faces overhaul,” *The Times Colonist*, March 25<sup>th</sup>, 2015. <http://www.timescolonist.com/news/local/b-c-s-municipal-auditor-general-office-faces-overhaul-1.1804843>

<sup>241</sup> Local Government in British Columbia, 2.

<sup>242</sup> Local Government in British Columbia, 200.

<sup>243</sup> Local Government in British Columbia, 201

have not traditionally been used to support agriculture, local governments could apply for funding for an agriculture project if program criteria are met, or could work with the Union of B.C. Municipalities<sup>244</sup> to lobby the Province to create a small grant program specifically for agriculture.

In addition to direct provincial grants, local governments have had success using cost-sharing grants with the provincial and federal and government. These grants are beneficial for three reasons: they reduce the financial burden for any one level of government, they show other governments a strong commitment to a specific project, and they can provide the start-up funding that a local government may require to get a program or project running. One successful example of cost sharing is the Sterile Insect Release (SIR) program in the Okanagan Valley, which relied on \$3 million dollar payments from provincial and federal governments to get started, but is now supported exclusively through local property taxes (the program costs \$3 million dollars per year to operate). Cost sharing has also been used through successful for funding through the Investment Agriculture Foundation of B.C. (IAFBC). IAFBC is an industry lead, not-for-profit organization that distributes provincial and federal money for agriculture projects in B.C., and has provided funding for various agriculture projects. For example, in 2014 the IAFBC provide a \$20,000 grant to the City of Kamloops for an Agriculture Area Plan to identify land-use priorities to support farming.<sup>245</sup>

## **Conclusion**

This chapter reviewed some of the key challenges for small-scale agriculture and local food systems in British Columbia. Primarily, growth of a more climate resilient food system in British Columbia will be constrained by the strong path-dependency of the industrial and internationalized food system that accounts for a significant portion of

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<sup>244</sup> There are numerous groups and associations that represent local governments and work closely with the Province to advocate for issues that impact local governments. The Union of British Columbia Municipalities is the largest and most influential of these organizations. There is a legal requirement for the Province to consult the UBCM on any legislative changes that will impact local governments, and the UBCM regularly lobbies the Province for policy changes that benefit local governments. “Local Government in British Columbia,” 12.

<sup>245</sup> Investment Agriculture Foundation of British Columbia, “Find A Project,” <http://iafbc.ca/find-a-project/> (Accessed May 14, 2015).

current food production. This productive system is heavily entrenched through financial investments made by growers, manufacturers, and retailers, and through policies that continue to support these industries. Although many political, bureaucratic and financial challenges exist, numerous opportunities can also remain to support resilient agriculture. The primary opportunity for policy makers to capitalize on is undoubtedly the growing public support for sustainable and local agriculture. As previously mentioned, this is most clearly displayed in the rapid growth of farm markets, numerous public opinion polls that highlight growing support<sup>246</sup>, the success of grassroots local food organizations such as FarmFolk/CityFolk, and through the increasing support for local food by governments and large agribusiness<sup>247</sup>

While these two powerful political forces greatly influence the modern agriculture policy environment in British Columbia, many smaller obstacles and opportunities will impact efforts to support small-scale agriculture and enhance resilience. As with most policy reform, small policy changes and low-cost programs are likely easier to implement than large-scale reform. It is difficult to predict what will be more beneficial for building a resilient food system in B.C: numerous incremental changes, or one or two significant policies. Drastic policy changes should not be completely ruled out. Past B.C. policies, such as the creation of the Agriculture Land Reserve, or the implementation of B.C.'s carbon tax show that major changes can be successful. Unfortunately, it is difficult to predict how and when these policies will succeed. For example, the implementation of the harmonized sales tax (HST) in B.C. in 2010 was very beneficial to farmers, but voters rejected the tax, forcing farmers to revert to the more costly and cumbersome provincial sales tax (PST) system.<sup>248</sup> As mentioned in the introduction, it can be very difficult to predict the success of a new policy or program. Even if a new policy has a positive impact on local production, future governments could reject funding, or businesses,

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<sup>246</sup> Jeff Nagel, "Strong appetite to defend farmland, buy local: poll" *BC Local News*, May 6<sup>th</sup>, 2011. <http://www.abbnews.com/news/121419044.html>

<sup>247</sup> Recently, numerous food producers from MacDonalds to Unilever, have unveiled advertising campaigns touting "local" ingredients in food products. For example, in 2009 Hellman Mayonnaise, owned by British-Dutch based Unilever, unveiled a Canada advertising campaign to promote the "local" ingredients in their product. For Good Food, "Promoting Hellman's Mayonnaise as "Local" Food in Canada," [http://www.foodforgoodblog.com/food\\_business\\_ethics\\_by\\_m/2009/06/promoting-hellmanns-mayonnaise-as-local-food-in-canada.html](http://www.foodforgoodblog.com/food_business_ethics_by_m/2009/06/promoting-hellmanns-mayonnaise-as-local-food-in-canada.html) (Accessed May 4th, 2014).

interest groups or citizens who favour alternative policy goals may oppose the policy or program.

In response to the broad spectrum of political forces that impact agriculture reform in British Columbia, it is necessary to analyze each of the policy options that were gathered from my interviews with small-scale farmers in the context of the political factors that could help or hinder their success. The tables in Chapter 5, below, document all of the policies discussed in chapter 4, and outlines some basic advantages and disadvantages of each policy, based on the political and economic issues found in chapter 5. Where possible, this review references the success or challenges faced by similar policies, which can help provide guidance on the expected reaction to certain policies. The appendix is divided into four categories, based on the four broad policy goals in chapter 4: farm land preservation, support for small-scale farmers, shifting consumption habits, and farm education and training.

Within each of these categories, the individual policies are organized based on their political do-ability, with the easiest policies (or, least likely to face financial, bureaucratic or political problems) listed first, and the most difficult last. The response to policy changes is very difficult to predict, and is always shifting based on external variables (e.g. the global economy), so this list is intended as a guideline only. This policy list offers a broad perspective on the types of policies required to support small-scale farmers, local food systems and a more resilient food economy. It would be very beneficial to undertake advanced analysis on individual policies to determine the impact it may have on food production, the specific costs of the policy, and if it could be implemented successfully. This detailed analysis was outside the scope of this particular study.

## Chapter 7 – Discussion and Analysis

The preceding two chapters discussed some of the policies that can help support small scale agriculture and local food systems in British Columbia, and also explored the political and social forces that impact small-scale agriculture policy in British Columbia. The intent of this final chapter is to combine all of this information in order to examine what obstacles and opportunities individual policies and programs may face. The policies are separated into the four broad categories discussed in chapter five: farmland preservation, support for small-scale agriculture, shifting consumption habits, and farm education/training. The policies are arranged based on their “ability to implement,” with the policies that should be easiest to implement listed first, and the more difficult policies listed later.

As the politics that impact policy implementation are never entirely predictable, this chapter presents a list of “pros” and “cons” associated with implementing each policy. The “pros” are political forces that will support implementation, while “cons” are forces that will create obstacles to implementation. These recommendations are intended to serve only as general guidelines.

### Policies to Preserve Farmland

<b>Policy</b>	Encourage private landowners and hobby farm owners to provide low-cost land leases to farmers looking for smaller plots of farmland. <sup>249</sup> There are two options to promote this policy: 1) provide free template lease agreements and contracts, so farmers/landowners can avoid potential legal problems (, and will not have to incur this cost on their own; 2) create a provincially administered online database that can link farmers to landowners.
<b>Pros</b>	-Very low financial requirements to draft sample lease agreements. -Government can consult with FarmFolk/CityFolk, who already provide a sample lease agreement, on lessons learned from their experience. Although FarmFolk/CityFolk already provide lease agreements, this organization may not reach as many prospective

<sup>249</sup> This was identified in my interview with Farmer #16 as an effective way to help new farmers overcome the challenges associated with finding or purchasing farmland.

	<p>farmers and a provincially administered program.</p> <p>-The Province, through the Major Investments Office, has successfully implemented a similar online database designed to link international investors to provincial business opportunities in B.C.<sup>250</sup></p> <p>-Unlikely to generate opposition from the business community or agriculture interest groups.</p>
<b>Cons</b>	<p>-Possible legal problems resulting from standardized contracts. For example, if a landowner asks a farmer to leave their land before the lease agreement is over, there would need to be a dispute resolution mechanism in place.</p> <p>-Online databases will require ongoing funding and maintenance from Ministry staff.</p>

<b>Policy</b>	<p>Continue to implement the nice recommendations made for improving the ALC in the Auditor General's Audit of the Agricultural Land Reserve. As of 2013, all nine of these recommendations were listed as "partially implemented."<sup>251</sup></p>
<b>Pros</b>	<p>-The ALC has broad public support to protect farmland in British Columbia.</p> <p>-The ALC has a long history of protecting farmland in B.C. and with proper funding and staff resources, is more capable or protecting farm than other government organizations.</p> <p>-These recommendations can be accomplished with relatively small budget increases from the Province.<sup>252</sup></p>
<b>Cons</b>	<p>-The ALC will continue to face pressure from local governments, landowners and developers to exclude farmland.<sup>253</sup></p> <p>-Unclear how much funding will be required to ensure all nine recommendations are "fully/substantially implemented"; this may require more funding from the Province.</p> <p>-Progress of nine recommendations has not been assessed in the context of Bill 24 – <i>The Agricultural Land Commission Amendment Act</i>, which drastically reshaped the ALC's protection of farmland in central and northern B.C.</p>

<b>Policy</b>	<p>Encourage local governments to follow the steps taken by the City of Vancouver to make public land available for agriculture, through the creation of more community</p>
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<sup>250</sup> British Columbia. Trade and Invest – British Columbia, "Investment Opportunities," <http://www.britishcolumbia.ca/invest/investment-opportunities.aspx#.VZb9oWM0-Xs> (Accessed May 10<sup>th</sup>, 2015)

<sup>251</sup> British Columbia. Office of the Auditor General, *Progress Audit – Agricultural Land Commission*. Victoria, B.C.: Government of British Columbia, 2013. <http://www.bcauditor.com/sites/default/files/publications/2010/report5/files/june-2014-follow-upagricultural-land-commission.pdf>

<sup>252</sup> The Report notes that an annual budget increase of \$1.6 allows the ALC to begin working on all of the recommendations noted in the audit.

<sup>253</sup> For example, in 2015 the City of Langford applied to remove "unusable" farmland from the ALR, in exchange for cash payments from the landowners that the City would use to build a local agriculture fund. These difficult issues, where it is unclear where the greatest benefit for food production lies, take a great deal of ALC resources to process. Katherine Engqvist, "Langford will ask for properties removal from ALR," *The Goldstream Gazette*, July 2<sup>nd</sup>, 2015. <http://www.goldstreamgazette.com/news/311477681.html>

	gardens or small-plot lease lands, which could include lands slated for future development, old gas station properties, or other public green spaces. <sup>254</sup> Local governments could create new spaces for agriculture on their own, or the Province could create a grant program designed to encourage local governments to make space for farming and help with costs that may arise (e.g. building fencing, clearing land, or administering leases).
<b>Pros</b>	-The City of Vancouver has successfully created space for urban agriculture, including publically owned lease land. Vancouver’s experience can be used as an example for other local governments, or to create a “how-to” guide to help other local government. -Relatively low start-up costs; local governments can create space for farming on publically owned space, instead of having to purchase new land.
<b>Cons</b>	-Administration costs associated with finding tenants, dealing with finances (e.g. lease payments and property taxes), and dealing with any problems that may arise as a result of active farming on public land. -Possible opposition from residents who live near farm properties over issues such as changes in appearance (e.g. manicured lawn turned into raised beds, fences and sheds), increased noise and activity, agricultural smells (e.g. composting), or rats. <sup>255</sup>

<b>Policy</b>	Allow farmers to bring non-ALR land that is capable of food production into ALR protection through use of a transfer-bonus or permanent land-use covenant. <sup>256</sup> This policy tool can help increase the amount of protected land in the ALR, and ideally provide more permanent space for agriculture.
<b>Pros</b>	-Only involves willing participants who want land protected. Does not force new restrictions on unwilling landowners. -Can be done on a case-by-case basis, which can minimize complications associated with province-wide mandatory reforms (e.g. bringing a new classification of land into the ALR). -Could be administered by the ALC using a standardized application process. May not require involvement from the provincial or local governments.
<b>Cons</b>	-Although some landowners may obtain ALR protection for their land for free, others may require financial compensation to encourage them to bring land into the ALR. This would require new provincial funding for the ALC, which could then be used to provide compensation to landowners. -Would require additional staffing resources at the ALC to administer the program, including program development, processing applications, and dealing with problems.

<sup>254</sup> Farmer #8 in Vancouver worked closely with the city to identify plots suitable for agriculture, and farmed on moveable containers on a series of four unused municipal parcels (totalling 4.5 acres) that includes two contaminated gas station sites, land slated for development and a municipal plot.

<sup>255</sup> One particular community garden in Vancouver developed a significant rat infestation and the city was forced to work with local stakeholders to deal with the problems. Deborah Gobel, “Rat problem grows at East Vancouver community garden,” *CBC News*, September 15<sup>th</sup>, 2014.  
<http://www.cbc.ca/news/canada/british-columbia/rat-problem-grows-at-east-vancouver-community-garden-1.2767232>

<sup>256</sup> In the sixteen interviews for this thesis, I encountered three farmers who were farming land that was not protected by the ALR. These parcels, located in the prime agriculture regions of central Vancouver Island and the South Okanagan, were very hospitable to agriculture. Two of these farmers noted that they would be willing to have their land brought into the ALR to ensure it was used permanently for agriculture.

<b>Policy</b>	Establish a permanent inventory of small farmland plots that are available for farmers to lease, similar to the model created by Haliburton farms in Saanich. These could be operated by local governments, possibly in conjunction with local community groups or agriculture associations (e.g. a not-for profit board). The success of Halliburton farms shows that local governments are the ideal level of government to operate such farms, as it is easier for them to deal with the complex local issues that may arise from operating lease land, such as obtaining land, purchasing land, dealing with land use issues (e.g. building permits for infrastructure), finding farmers, and dealing with unexpected problems.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Local governments can use the experience from Saanich and Haliburton Farms to help develop similar programs.</li> <li>-Local implementation and administration can help navigate unique local challenges, possibly avoiding complications from provincially administered program.</li> <li>-Aside from start-up costs (e.g. purchasing land, building fences, and establishing rules), annual operation costs are small, and can be partially covered by lease payments.</li> <li>-A provincially administered grant program could help local governments purchase land; this could possibly be done through cost sharing agreements.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Significant start-up capital required to obtain good quality farmland in a useable location. This will be difficult for local governments as many face strict budget conditions and have limited means to raise capital for large expenditures</li> <li>-May face opposition from local taxpayers due to costs, especially if farm plots are not used, or there are problems with administration of the farm (e.g. conflict choosing lessees).</li> </ul>

### Policies to Support Small-Scale Farmers

<b>Policy</b>	Encourage public institutions (schools, hospitals, community centres) to accommodate farm markets or smaller “pocket markets” to help citizens connect with local farmers in busy public places. This includes creating space for one or two farms to set-up and sell goods at a public location. This can help farmers connect with purchasers who may not normally traditional farm markets. The BCAFM could work with local governments or public institutions to help connect with willing participants (e.g. a community centre), administer the program, and deal with organization challenges.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Does not require the same level of organization (e.g. closing a busy street) as a traditional farm market.</li> <li>-More flexible than traditional farm markets. For example, if a specific location does not work, a pocket market could move the following week.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Additional support for the BCAFM would likely be required to ensure they have the staff and resources required to develop training materials and work with participants.</li> <li>-Would require a fair and consistent selection process to choose which farms participate. A flawed process that did not provide an equal opportunity to different farms to participate could lead to tension between farmers, or between farmers and host institution.</li> </ul>

<b>Policy</b>	Provide more provincial funding and resources to the B.C. Association of Farmers Markets (BCAFM) to help develop markets, advertise markets, host workshops for market organizers, or hire a provincial coordinator to help markets deal with administrative issues (e.g. obtaining liquor permits for beer gardens). Work with BCAFM to research why the reasons that certain communities have strong farm market culture so these lessons can be shared with other regions.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-The BCAFM has the experience, organizational capacity and network (with community organizers and farmers) required to effectively administer an expanded mandate to help develop farm market culture across British Columbia.</li> <li>-Local government participation in farm-market is voluntary, so the BCAFM is only required to work with willing participations.</li> <li>-As the BCARM provides services across the province, additional funding for this organization helps all communities, avoiding possible problems associated with providing grant money to specific communities and not others.</li> <li>-BCAFM has traditional relied on grants from both governments (Ministry of Agriculture), and private business (Vancouver City Credit Union), which may reduce the financial reliance on government grants.<sup>257</sup></li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Will require additional funding for staffing and materials from the Province (assuming private grants cannot provide this support)</li> <li>-Should ensure BCAFM support is distributed equally amongst communities (or according to population), so certain communities do not receive a disproportional amount of support.</li> </ul>

<b>Policy</b>	Expand the B.C. Farmers' Market Nutrition Coupon Program (FMNCP) through the BCFMA. Expansion of the FMNCP could be used to reach new segments of the population (e.g. university students) or provide higher value coupons to low-income families, seniors and new immigrants.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Does not require development of a new program; can utilize the framework of the existing program.</li> <li>-Primarily benefits citizens in-need of economic or social support, which may reduce potential opposition from taxpayers concerned about program costs.</li> <li>-Simple reimbursement process for farmers. Once a farmer accepts a coupon, they are only required to submit the coupon to the BCFMA to get reimbursed. This reduces the paperwork required by small-scale farmers.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Potential for abuse (e.g. coupon recipients sell coupons for cash).</li> <li>-Expanding the program will require more Provincial funding for the BCFMA. As of 2014, the program received \$4.75 million dollars from the Province per year.<sup>258</sup></li> <li>-Requires staffing resources at the BCFMA to work with other Ministries to identify qualifying participants and get coupons and program information to them.</li> </ul>

<b>Policy</b>	Develop incentives to help support community supported agriculture (CSA) programs. This could be accomplished through farm mentorship programs that help new farmers
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<sup>257</sup> British Columbia Association of Farmers's Markets, "Supporters," <http://www.bcfarmersmarket.org/about-us/supporters> (Accessed May 15th, 2015).

<sup>258</sup> British Columbia. Ministry of Health. *New Funding Gives Farmers' Market Program Staying Power*. Victoria, B.C.: Government of British Columbia, 2014. <https://news.gov.bc.ca/stories/new-funding-gives-farmers-market-program-staying-power>

	develop a CSA program, or by encouraging public institutions (e.g. schools or hospitals) to participate in CSA programs.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Could be developed and administered by a farm-advocacy organization such as FarmFolk/CityFolk the Young Agrarians, or the BCAFM.</li> <li>-Can use public education (e.g. funding for FFCF to advertise about benefits of CSA), or farmer training (e.g. a provincially- funded training manual on how to develop a CSA program), which are likely less costly and easier to administer than rebate programs or tax incentives.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Would require provincial funding for program development and advertising costs.</li> <li>-If this program is developed and administered through a third party organization, the Province should ensure funds are being used effectively.</li> <li>-Requires upfront financial investment by public institution (e.g. a hospital), which may be difficult as public institutions generally have limited budget space.</li> <li>-Potential administrative and financial problems associated with public institutions purchasing a CSA share. For example, if a farmer has a bad crop and a hospital does not receive as much food as expected, this could lead to administrative problems (e.g. have to order more food from a retailer).</li> </ul>

<b>Policy</b>	Develop a community farm market infrastructure program that helps municipalities develop new market spaces <sup>259</sup> and infrastructure (e.g. shelters, parking, road signs, or bathrooms etc) for local food markets. This could be administered through a provincial grant program, or a grant program that required local governments to match provincial funding.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Would require local governments to submit detailed plans on how the funding would be used to support agriculture, which could help minimize the possibility that money would be misused.</li> <li>-Local governments could work with the BCAFM to develop effective community market plans (e.g. location, infrastructure required), and submit grant proposals.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Would require significant Provincial funding to administer the program and provide grant money to local governments.</li> <li>-Unequal distribution of grant money between communities could lead to administrative issues for the Province or political problems for MLAs (e.g. local government complains to MLA about insufficient or unequal funding).</li> <li>-Potential for financial abuse. This could happen if project is not managed properly, or there are issues with contractors. This could lead to more administrative issues for the Province (e.g. auditing projects).</li> <li>-Local taxpayers could oppose the program if facilities are too costly, or are not used (e.g. a community builds a permanent shelter, but the market is cancelled).</li> </ul>

<b>Policy</b>	Create a provincial funding program to help municipalities, regional districts, cooperatives or local farm associations purchase community-owned equipment and infrastructure that could be used by local farmers. There is a need for mobile abattoirs,
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<sup>259</sup> This could be used to provide funding for indoor markets similar to the one Farmer #9 was working on in Central Vancouver Island.

	wood chippers, composting facilities, processing facilities, storage facilities, and pest-management programs. <sup>260</sup>
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Would require local governments to submit detailed plans on how the funding would be used to support agriculture, which could help minimize the possibility that money would be misused.</li> <li>-Could rely on cost-sharing structure to help reduce program costs, and ensure applicants (e.g. local government, cooperative, or farm association) is committed to project.</li> <li>-Less administrative requirements than programs that provide funding to individual farmers, as the number of applicants is greatly reduced.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>Would require significant Provincial funding to administer the program and provide grant money to applicants.</li> <li>-Unequal distribution of grant money between communities could lead to administrative issues for the Province or political problems for MLAs (e.g. local government complains to MLA about insufficient or unequal funding).</li> <li>-Potential for financial abuse. This could happen if funding is not used properly, or equipment/infrastructure is not managed properly. This could lead to more administrative issues for the Province (e.g. auditing projects).</li> <li>-Local taxpayers could oppose the program if facilities are too costly, or are not used (e.g. a community builds a permanent shelter, but the market is cancelled).</li> </ul>

<b>Policy</b>	Provide funding and guidance to help hospitals, prisons, care homes and schools purchase and prepare their own food (including local food), instead of using centralized production centres. This could include training on how to procure contracts with local farmers to ensure B.C.'s public institutions are supporting local agriculture.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Only minimal funding required to develop training materials for public institutions, such as instructions on how to procure local food contracts. More funding may be required if institutions need to upgrade kitchen facilities.</li> <li>-Although food costs may increase, provincial tax revenue is spent on local products (food), which may reduce the chance that taxpayers will oppose the program.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Public institutions may be satisfied with existing food services and unwilling to incorporate local food (they may see this as too difficult, or not have the staffing requirements).</li> <li>-Would require funding and resources from the Ministry of Health to develop guidelines for purchasing food, cooking local food (or incorporating it into meals), and dealing with problems.</li> <li>Could increase food costs for hospitals and prisons, which would increase funding requirements from the Province.</li> <li>-May require Provincial funding to help hospitals or prisons purchase new kitchen equipment to prepare fresh food.</li> <li>-Hospitals and prisons may have to wait until contracts with food supplies end, or renegotiate existing contracts.</li> <li>-Taxpayers may oppose the idea of spending extra tax revenue to provide prisoners with</li> </ul>

<sup>260</sup> The interview participants confirmed how community-owned infrastructure could help small-scale farmers and increase local food production. For example, the Boundary Country Livestock Cooperative (BCLC) obtained a \$300,000 grant through the Western Economic Diversification Fund to purchase a mobile abattoir that helped small-scale livestock producers.

	local food.
<b>Policy</b>	Create funding program that assists individual farmers build the infrastructure required for successful production, such as a grant for deer fencing, greenhouses, water wells, or other buildings. <sup>261</sup> This could be administered provincially or directly by local governments, and could use a cost-sharing structure where government could match funding paid by a farmer.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Can help new farmers reduce the start-up costs associated with developing a farm.</li> <li>-A 50/50 cost-sharing structure could be used to reduce program costs.</li> <li>-Could use a reimbursement process (rather than providing up front funding) to reduce potential for abuse.</li> <li>-Could utilize a standardized (e.g. developed through the Ministry of Agriculture) application reduce potential for abuse. For example, farmers are required to submit detailed invoices, photos of project to get funding.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Would require a significant funding commitment if administered provincially (funding would be required to service farms around the Province). If administered by local governments, it may be difficult for individual municipalities/regional districts to find funding; local taxpayers could oppose program if program costs are too high, or lead to tax increases.</li> <li>-Would require additional staffing resources to administer program. This could be especially difficult for smaller local governments.</li> <li>-Numerous administration challenges. For example: 1) The program should ensure specific guidelines are followed (e.g. land size requirements are met or fence are built to proper specifications to keep deer out); 2) The program could be inundated with application and unable to provide funding to all applications, resulting in complaints from farmers who didn't receive funding.<sup>262</sup></li> <li>-High potential for abuse. For example: 1) Funding could be used by landowners who do not actively farm on their land; 2) Funding could be used by property investors to increase the value of their land prior to selling.</li> </ul>

<b>Policy</b>	Re-implement the Harmonized Sales Tax (HST) to allow farmers to purchase all farm inputs tax-exempt, or make changes to the Provincial Sales Tax (PST) to broaden the farm exemptions.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Tax changes will reduce costs for farmers across the Province and will be supported by farmers, interest groups and agriculture associations.<sup>263</sup></li> <li>-Reduces the administrative burdens for farmers. Under the HST system, farmers can write-off all tax costs on their tax return. Does not require a rebate or refund process, or unnecessary paperwork.</li> </ul>
<b>Cons</b>	-Many provincial citizens, businesses and organizations oppose the HST and voters in a provincial referendum specifically rejected the tax. It will be very difficult for a political

<sup>261</sup> Three of the farmers I interviewed benefited from infrastructure grant programs to help build deer fencing (this was done using a 50/50 cost sharing agreement), and install water wells.

<sup>262</sup> Farmer #13 noted this was a problem in his community. He stated that a large dairy farm in his community had received the majority of funding available for fencing as they had constructed a very large fence as soon as funding became available.

<sup>263</sup> The BC Agriculture Council was supportive of British Columbia keeping the harmonized sales tax (HST) in the provincial referendum. Chartered Accountants of British Columbia, "HST is key to strong economy in B.C.," <http://www.ica.bc.ca/kb.php3?artid=3094> (Accessed May 15<sup>th</sup>, 2015).

	<p>party to re-implement without facing serious political risk.</p> <ul style="list-style-type: none"> <li>-Creating new PST exemptions for farmers will lead to lower tax revenue, and may be opposed by other industries who also want new exemptions from PST (e.g. the oil and gas industry or manufacturers).</li> <li>-Changing tax legislation will require significant administrative work (drafting new legislation), and will require the new legislation to be debated and passed in the Legislature.</li> </ul>
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## Shifting Consumption Habits

<b>Policy</b>	<p>Work with the Ministry of Education to add more information on climate change, sustainable consumption practices, local food consumption, and agriculture into K-12 curriculums. Create space for agricultural lessons (e.g. school gardens) at schools. Work with public schools to implement school lunch programs that provide local food options to expand students<sup>264</sup>.</p>
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Funding for curriculum changes are generally built into annual Ministry budgets.</li> <li>-Changes to school curriculum to focus on health and sustainability will receive support from numerous health and educational organizations.<sup>265</sup></li> <li>-Minimal funding required to develop school gardens; schools may be able to find local individuals or businesses to donate certain items (e.g. wood for raised beds, or soil).</li> <li>-Costs for school lunch program are largely covered by fees (low income students may require financial support from the school).</li> <li>-School farms and lunch programs can rely on parent/volunteer/community assistance, or guidance from local farmers,<sup>266</sup> to overcome certain obstacles (e.g. not having a teacher with an agricultural back ground, or not having enough staff to monitor a school lunch buffet).</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Funding and staffing required if the Province undertakes major curriculum overhaul.</li> <li>-Small administrative requirements to individual schools to develop and administer a school lunch program.</li> <li>-Requires the support of school administrators and teachers.</li> <li>-Curriculum changes may be challenged/opposed if they are overly critical of certain unsustainable elements of the current food system (e.g. The Cattleman's Association may have issues with a critical perspective of meat production and consumption).</li> </ul>

<b>Policy</b>	<p>Work with COABC to develop a clearer and more comprehensive organic certification-labeling program to help consumers identify organic products, or products produced</p>
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<sup>264</sup> School lunch programs that incorporate healthy and local food options are increasing in popularity across the province. There are many school programs that can be used to develop new program guidelines for other schools. Public Health Association of British Columbia. Farm to School Program. "Put Your Farm to School Program on the Map."  
[http://www.phabc.org/modules.php?name=Ftsreg&pa=list\\_schools&pid=11&sid=1&ok=2](http://www.phabc.org/modules.php?name=Ftsreg&pa=list_schools&pid=11&sid=1&ok=2) (Accessed March 15, 2012).

<sup>265</sup> For example, the Provincial Health Services Authority is very supportive of incorporating more information on agriculture, local food, and healthy lifestyles into school curriculums. Provincial Health Services Authority, "Promoting Healthy Eating And Sustainable Local Food in BC," June 2011.  
<http://www.phsa.ca/Documents/foodactionframeworkforpublicinstitutions.pdf>

<sup>266</sup> Farmer #10 volunteered at a local elementary school to help set-up the community garden.

	<b>using sustainable farming practices.</b> Work with COABC or other certification bodies to develop advanced organic certification standards, such as Biodynamic certification, that confirm certain goods meet the strictest environmental standards.
<b>Pros</b>	-The COABC has a long history of developing organic standards, and has the organizational capacity and network (with farmers, agricultural organizations and certifying bodies) to implement changes to this system. -The COABC has already identified many of the issues facing the organic industry, and understands the funding or resources required to deal with these issues. <sup>267</sup>
<b>Cons</b>	-Expanding the scope of the COABC will likely require funding from the Ministry of Finance. -Other agricultural sectors, interest groups, or producer associations who also require funding for program development may oppose additional funding for the COABC. -Consumers may see “organic” primarily as a health issue, rather than an environmental/emission issue, possibly reducing the impact of better labeling. -Organizational challenges within the COABC may complicated efforts to expand their mandate, or develop more advanced labeling standards (e.g. a label for products grown with only local fertilizers). -Many small-scale farmers are opting out of the certification process due to administrative challenges and registration costs. <sup>268</sup> A more comprehensive organic labelling process will not assist these farmers, or may lead to increased challenges between certified and uncertified growers. <sup>269</sup>

<b>Policy</b>	<b>Develop a unified local-food branding campaign, or re-implement the BuyBC program.</b> Provide increased funding for brand development and advertising, and to ensure producers and retailers participation (e.g. working with retail chains to feature BuyBC products).
<b>Pros</b>	-Likely to be supported by farmers and agricultural interest groups and associations. -Could rely on support from key agriculture groups like the BCAC and BCFMA to help farmers and retailers administer the program (e.g. work with retailers to get promotional materials set-up in effective locations).
<b>Cons</b>	-Would require significant financial investment from the Ministry of Agriculture to fund the program. Program would require additional staffing to develop and administer the program, and funding to pay for advertising. -Some producer associations may prefer a non-unified local-food advertising program, similar to the “Buy Local” program. <sup>270</sup> This would allow specific sectors undertake their own branding and marketing strategy (e.g. apple producers may want to emphasize how apples grown in B.C. generally require less pesticides than apples produced in Ontario). <sup>271</sup>

<sup>267</sup> Certified Organic Association of British Columbia, “Stretching Our Horizons: Strategic Plan for the B.C. Certified Organic Sector – 2013-18, 2013, [http://certifiedorganic.bc.ca/docs/2013\\_Organic\\_Sector\\_Strategic\\_Planning\\_Project.pdf](http://certifiedorganic.bc.ca/docs/2013_Organic_Sector_Strategic_Planning_Project.pdf)

<sup>268</sup> Five of the farmers I interviewed practiced organic methods, but choose not to become certified due to the increased administration and costs associated with certification.

<sup>269</sup> Both Farmer #9 and #10 expressed frustration with non-certified farmers calling their product “organic,” as they felt it forced certified growers to reduce their prices.

<sup>270</sup> British Columbia. Ministry of Agriculture. “B.C. Buy Local Program,” <http://www.gov.bc.ca/agri/buylocal.html> (Accessed May 11th, 2015).

<sup>271</sup> This issue was raised by Farmer #4, who believed that many B.C. residents didn’t that B.C.’s unique dry climate meant that apples were produced with far less pesticides than apples from Ontario.

<b>Policy</b>	Launch a public advertising campaign to promote the benefits associated with low-emission foods, local products and local food systems. <sup>272</sup> This could be developed and administered in conjunction with local food advocacy organizations such as FarmFolk./CityFolk, the BCAF, or the BCAC, or with health-advocacy organizations such as the Ministry of Health, or the Public Health Association of British Columbia.
<b>Pros</b>	-An advertising campaign can be administered through the Ministry of Agriculture. -Would likely receive support from farmers, agriculture interest groups and advocacy associations. -To reduce advertising costs, ads could be placed primarily in public spaces (e.g. schools, hospitals), where there are no costs to display promotional materials.
<b>Cons</b>	-Significant funding required to develop advertising and purchasing advertising placements (e.g. purchasing space in magazines and newspapers). -Additional resource required to measure program effectiveness to ensure that the campaign has an impact on consumer's perspective of local food consumption. -Program may be opposed or challenged by taxpayers, businesses, or interest groups who see it as a poor use of taxpayer money (e.g. as compared to funding new hospital beds, or lowering taxes).

<b>Policy</b>	Work with the Ministry of Agriculture and Environment to develop and promote an optional carbon-labeling program. Alternatively, the Province could work with (and provide funding to) environmental or agricultural organizations to develop optional carbon labeling standards for food products.
<b>Pros</b>	-Optional labeling, or "best in class" labeling, reduces the burden on farmers/producers who do not want to participate in a program, or feel new labeling will increase costs. -There may be opportunities to work with universities and other research institutions to develop effective methods to measure or calculate the GHG of specific goods. <sup>273</sup>
<b>Cons</b>	-Will require significant Provincial funding to develop the program, including funding to research the GHG of food products, and funding to administer and advertise the program. -Will require additional resources and funding to ensure program is effective (e.g. consumers recognize the label and it shifts their consumption). -Potential that producers/retailers will not participate in the program. -Potential that new labeling or branding will not resonate with consumers (e.g. a product contains too many labels or customers don't recognize or can't understand a carbon label). -May not be supported, or will be opposed, by food sectors that produce the most emissions (e.g. the dairy industry, or meat producers). -May not directly benefit small-scale farmers/producers who sell unpackaged products (e.g. produce), as they do not require labeling.

<sup>272</sup> A Provincial advertising campaign could be similar to the successful Sodium Sense campaign, discussed in Chapter 4.

<sup>273</sup> For example, the Carbon Trust labeling program in the United Kingdom relies on external research to help determine how this particular program shifts consumption practices: Zaina Gadema and David Ogelthorpe, "The use and usefulness of carbon labeling food: a policy perspective from a survey of UK supermarket shoppers," *Food Policy*, 36 (2011), 815-822.

<b>Policy</b>	Work with other provinces and the federal government to develop mandatory carbon labeling regulations.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Likely to receive support from environmental organizations.</li> <li>-May receive support from manufactures of low-emission products; although there may be cost increases associated with mandatory labeling, it may give them a competitive advantage over other food sectors.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Mandatory labeling is likely to be opposed by many food producers, manufacturers and industry groups, as it may lead to higher production costs (e.g. costs associated with designing new labels), and may shift consumption, which could lead to reduced profits for certain industries.</li> <li>-Significant resources and funding required to research, develop and administer a mandatory labeling program. Would require a clear framework to help producers determine the GHG of products, and government audit resources to ensure proper compliance.</li> <li>-Could be complicated by Canada's large land mass (e.g. incorporating transportation emissions into a label may be very difficult, as producers won't know how far the end product will travel).</li> <li>- May not directly benefit small-scale farmers/producers who sell unpackaged products (e.g. produce), as they do not require labeling.</li> </ul>

### Farm Education and Training

<b>Policy</b>	Work with the Ministry of Education to provide agricultural training at secondary schools (e.g. school farms, or opportunities to learn at local farms), and ensure students recognize farming and food production as a career choice.
<b>Pros</b>	<ul style="list-style-type: none"> <li>--Funding for curriculum changes (e.g. updating career planning courses to include agriculture) are generally built into annual Ministry budgets.</li> <li>-Minimal funding required to develop school gardens; schools may be able to find local individuals or businesses to donate certain items (e.g. wood for raised beds, or soil).</li> <li>-Schools that do not want to build permanent gardens, or don't have faculty to teach farming, can send students to local farms for training.</li> <li>-Ministry of Agriculture could work with farm advocacy organizations (e.g. Young Agrarians) to develop training materials.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Funding and staffing required if the Province undertakes major curriculum overhaul.</li> <li>-Small administrative requirements to individual schools to develop and administer a permanent space for farming.</li> <li>-Requires the support of school administrators and teachers. Schools will likely require at least one staff member to actively manage a garden and farm program.</li> <li>-Schools may not be interested, or have the resources, to develop and agriculture program. For example, many schools dedicate funding and staffing resources to other trades programs.</li> <li>-Without enthusiastic teachers, students may not participate in school gardens or an agriculture program.</li> </ul>
<b>Policy</b>	Expand extension agent services. Provide funding for a new extension agent to help small-scale farmers with questions on production, organic farming, pests and fertilizers. Additional funding could expand extension agent services to provide farmers with

	information on other important aspects of farming such as purchasing or leasing property, business planning, marketing, obtaining grants, or legal issues
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Can provide assistance to farmers around the province without providing direct financial payments to farmers.</li> <li>-Low administrative requirements. Extension agents can operate primarily by phone and email from a permanent location.</li> <li>-There may be opportunities for the Ministry of Agriculture to work with agricultural organizations (e.g. FarmFolk/CityFolk or the BCAC) to find suitable extension agents and promote the service.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Will require funding from the Province to hire extension agents.</li> <li>-Extension agents can only provide advice on certain aspects of farming (e.g. an agent with an organic or poly culture background may not be experienced in large-scale blueberry production or chicken production). This may create tension between sectors of the farm economy that cannot receive support.</li> <li>-If farmer demand for extension services is greater than the number of agents available, farmers may be frustrated with the program and not provide positive reviews to the Ministry (e.g. telephone wait times are too long, or an agent is too busy to respond to an e-mail question in time).</li> </ul>

<b>Policy</b>	Develop a new farm-mentorship program to help new farmers receive training and guidance from experienced farmers in their area. Provide funding to the Young Agrarians to expand their Business Mentorship Network program to provide mentorship services, in absence of a provincial program.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-The Ministry of Agriculture can use Business Mentorship Network program as a template to build a provincially administered program.</li> <li>-Provincial funding for the Business Mentorship Network (to be administered by the Young Agrarians) could reduce the funding and resources required to develop a provincially-administered program.</li> <li>-A cost-sharing approach, where by new farmer must pay for a portion of training, could reduce costs for the Province.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Will require provincial funding to develop and administer a provincial program, or will require funding to provide support to the Business Mentorship Network program</li> <li>-If the Province provides funding to the Business Mentorship Network program, they should develop guidelines to ensure funding is used effectively (e.g. audit certain participants to ensure compliance).</li> <li>-Experienced farmers, or farm associations and industry groups that represent farmers, may lobby government to use this funding for other purposes (e.g. support for existing farmers).</li> </ul>

<b>Policy</b>	Work with the Ministry of Advanced Education and post-secondary institutions to develop more agricultural courses and programs. Work with the Ministry of Advanced Education to explore opportunities to develop more comprehensive agricultural programs (e.g. a diploma or degree), similar to those offered by Kwantlen Polytechnic University and University of the Fraser Valley.
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Institutions can cover the costs of agricultural classes or a program partially through tuition payments.</li> <li>-Many post-secondary institutions have the space required for a smaller garden or campus farm.</li> <li>-Some institutions may be able to incorporate agricultural courses into environmental or biology departments.</li> </ul>

<b>Cons</b>	<ul style="list-style-type: none"> <li>-Individual institutions may not be interested in funding or developing agricultural training and may resist provincial efforts to force them to do so.</li> <li>-Would require individual institutions to provide funding and staffing resources to develop courses or build garden space.</li> <li>-Would require significant provincial funding to develop and fund a new agriculture-focused institution (e.g. a new agriculture university on Vancouver Island).</li> </ul> <p>Ministry of Advanced Education would need to ensure there is sufficient demand before funding a new agricultural program.</p>
<b>Policy</b>	<p>Develop a labour transition program to provide incentives for people to starting farming.<sup>274</sup> This could include a program designed to target workers in specific industries (perhaps high-emission industries such as oil and gas production) to encourage them to start farming.</p>
<b>Pros</b>	<ul style="list-style-type: none"> <li>-Could be integrated with existing employment insurance services offered by the Federal Government.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>-Very difficult to administer. For example, would require clear guidelines to determine when an applicant is deemed to have started farming.</li> <li>-Would require significant funding and staffing resources to develop the program and provide funding to applicants.</li> <li>-May be difficult and costly to ensure applicants can access the land required to start farming.</li> <li>-Program cannot ensure an applicant will become a successful farmer (e.g. they will make enough annual income to continue farming long-term).</li> <li>--Experienced farmers, or farm associations and industry groups that represent farmers, may lobby government to use this funding for other purposes (e.g. support for existing farmers).</li> </ul>

<sup>274</sup> Farmer #10 relied on a transition program that provided him with temporary financial support to leave the commercial fishing industry and start a farm.

## Thesis Conclusion

This thesis set out to explore how British Columbia's food system can develop greater resilience in order to prepare for the dangerous impacts of climate change. In particular, I wanted to explore the political and economic factors that will impact resilience-focused policy reform, in order to understand which new policies and programs have the best chance at successful implementation. It is vitally important to explore the political feasibility of policy reform, especially when reform will challenge long-standing social and economic structures such as industrial food production, established distribution and retail networks that support international agriculture, and high-emission consumption habits. To acknowledge the powerful impact of free-market economics, political actors and policy legacies, this thesis provides a focused review of politically do-able policies that can enhance climate-resilience.

The initial research for this paper presented two challenges that I needed to address in order to discuss policies that can enhance agriculture resilience. First, there is a lack of comprehensive research that considers the resilience of food systems, particularly with a focus on Canada or British Columbia. To overcome this, I completed a literature review of resilience literature and derived a set of principles that highlight how a food system can become more resilient. My general analysis suggests that a resilient food system is built on three important attributes: internal strength, diversity and flexibility. Secondly, my initial research indicated that resilience is a multi-faceted challenge that will require a degree of policy reform that was far too large in scope to be captured in a thesis. For example, resilience not only requires policies designed to preserve farmland, increase local production and add diversity, but also requires policies to reduce agriculture emissions, expand production in northern B.C., prepare for water challenges, address the safety of GMOs, explore trade relationships with other provinces and countries, deal with social issues such as food affordability, public health and safety, and develop our understanding of climate problems.

Although this thesis explored how British Columbia can develop greater resiliency across the entire food system, there is still a need for future research on the precise application of resilience theory to food systems. It may also be valuable to

reconceptualize research on resilience to focus more closely on the characteristics of flexibility. This thesis defined resilience as the ability of a system to remain “functionally stable”<sup>275</sup> in the face of a disturbance. Although the ability to remain functionally stable is desirable, in some circumstances the end goal of maintaining stability may be too limiting. For example, it may not be possible for a specific region to remain stable in the face of an extreme crisis such as long-term flooding or drought, or for a farm to remain stable in event of a crisis, such as more frequent annual hail storms. Instead, a food system or a farm may need to undergo a drastic transformation in order to continue producing food. A high level of flexibility (e.g. less focus on remaining “stable”) may be a strong defense against increasingly unpredictable climate scenarios. This concept of flexibility was best displayed by farmer #12, who farmed in mobile containers and could move to new locations around the city very quickly to take advantage of cheap and available land plots. A highly flexible farmer may not be tied to a particular piece of land or region, and could move quickly, taking only their knowledge and basic tools, in order to continue producing. More research on this concept of flexibility, including examples of how it may be achieved across the food system, would be valuable to discussions on resilience.

Rather than broadly discussing all areas of policy reforms required to enhance resilience, I decided to pursue an in-depth policy review on how small-scale agriculture and local food systems can develop agricultural resilience in B.C. I choose these specific issues because they are closely connected to the quickly growing local food movement in British Columbia, and because they offer a very viable way to increase domestic food production in British Columbia. Furthermore, there are many innovative and politically feasible policy options types that can help develop small-scale agriculture and support local food systems. For example, the Province can encourage public institutions such as schools and hospitals to make space for small pocket markets, so farmers have greater access to local customers. This could be accomplished with minimal funding. Similarly, the Ministry of Agriculture can continue to support exciting projects offered by the B.C. Farmers’ Market Association, such as the Farmers’ Market Nutrition Coupon Program, to

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<sup>275</sup> Charles L. Redman and Ann P. Kinzig, “Resilience of Past Landscapes: Resilience Theory, Society, and the Longue Duree,” *Ecology and Society* 7 no.1 (2003): 2.

help expand farm market culture throughout the province. Ideally, as the local food movement continues to grow, there will be greater pressure from voters and taxpayers for governments to support this economy; competing business interests (e.g. large scale agriculture and corporate retailers) will be less likely to oppose government funding or policies that support local food. As the local food movement grows, large retailers who tradition support large-scale producers, may adapt to consumer demand and begin supporting local growers; this will only provide further momentum for local production.

As there is a significant amount of literature on policies that can assist small-scale farms and strengthen local food economies, the goal of the interview process was to bring a local perspective to this policy research. Although the interviews provided a valuable perspective into the types of policies small-scale farmers require, I realized that there is a diversity of perspectives under the “small-scale” umbrella, and it was very difficult to summarize the multitude of perspectives I encountered. For example, the requirements of a small-scale (e.g. 10 acre) apple farmer who owns their own land, like Farmer #1 and Farmer #4, are very different to the requirements of a small-scale (e.g. .5 acre) poly-culture grower who leases land in an urban setting. Therefore, there is a great need for targeted research challenges and successes, and policy requirements, for specific groups of small-scale farmers.

In particular, future research should focus on the unique challenges for small polyculture farmers who do not own their own land. This research is crucial, as these farmers have enormous potential to strength B.C.’s food system. Small polyculture growers on leased land are particularly important as they are flexible (they can start farming or move locations quickly and easily), and they can farm on the small plots of land that are available in growing urban regions (e.g. old gas station properties or land slated for development). These farmers also face numerous disadvantages in comparison to established growers; primarily, their perspectives are not included in policy discussions to extent that established growers and large-scale producers are, as it is difficult to succinctly summarize their diverse requirements, and there are no powerful industry groups to represent. Furthermore, it is very hard for them to take advantage of government funding and support, such as crop insurance programs, marketing grants (such as the Buy Local campaign), or property taxation benefits. Government support for

organizations that support these growers, such as support for the BCFMA or FarmFolk/CityFolk, or grants for community infrastructure (e.g. a communal abattoir) or community farmland (like Haliburton Farms), can help support these growers with minimal bureaucratic challenges.

The scale of climate change and its impact on food systems is extensive and complex. This challenge is heightened by the fact that climate change will impact all industries around the world, including energy production and transportation, which will create secondary and challenges for agriculture. Governments should begin the process of building more secure food systems that incorporate resilient features. This thesis provides one small piece of research on how British Columbia can go about achieving this difficult task. Governments, policy makers, researchers and citizens can use this research to add to the complex discussion on climate change and agriculture in order to help build strong future food systems.

## Appendix A

The research for this thesis relied on in-depth interviews with sixteen small-scale farmers from British Columbia's three primary agriculture regions. All interviews were recorded on an audio device and were later transcribed on a computer. The interviews followed a general format of pre-arranged questions which were used to initiate broader discussions. The questions proposed to each participant are as follows:

- 1)When did you start farming?
- 2)What is the size of your current farm and how did you obtain the land?
- 3)What goods do you produce and how do you sell them?
- 4)What challenges did you face when you began farming?
- 5)What government policies or programs did you use to begin farming?
- 6)What government policies or program do you currently use?
- 7)What new policies or programs do you think would be most beneficial to your farm?
- 8)What new policies or programs do you think would be most beneficial to new small-scale farmers?
- 9)What are your biggest current challenges?
- 10) What successes have you had that could benefit other farmers?

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