Hungry for a Serious Food Production Plan

in the City of Vancouver

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1.0 INTRODUCTION

In recent years, a variety of concerns such as peak oil, global warming, climate change and rapid urbanization, have helped bring the issue of food security to the attention of planners and policymakers. Food security is the assurance that "food is available at all times, that all persons have means of access to it, that it is nutritionally adequate in terms of quantity, quality, and variety, and that it is acceptable within the given culture"[1]. There are a number of ways to address the issue in developed world cities including increasing food production within city boundaries, improving access to grocery stores and markets, processing and distributing food locally, and recycling wastes.

The City of Vancouver and others are engaged in a diversity of food security initiatives. However, these projects are less focused on building systems that will provide as much food as possible for city residents but rather look at community economic development, ecological health, social justice, collaboration and participation, and celebration[2].

Specific goals and objectives

My objectives for this project are to:

- Examine the growing interest in food security among planners and policymakers
- Analyze food security groups and initiatives in the City of Vancouver
- Create a framework for food production

This report is written and researched for staff and officials at the City of Vancouver, Vancouver Coastal Health, the Vancouver Food Policy Council and interested community members, and details the requirements needed to maximize food production and food self-reliance in the City of Vancouver. This report provides a plan and a set of recommendations in an effort to increase the quantity of food produced in and around city limits to decrease dependence on imported food, increase the level of residents' food security, and avert future crises that may leave urban residents with limited varieties or insufficient quantities of food.

2.0 PROBLEM STATEMENT

2.1 Planning Cities Without Planning For Food

Planners, in their quest to be "comprehensive, future-oriented, public interest driven, and wanting to enhance the livability of human settlements"[3] should help to ensure that communities have access to sufficient amounts of nutritious food. However, planners and municipalities have traditionally focused on land use development, housing, transportation and environmental conservation, and have often overlooked food security and food systems planning as a means to create sustainable communities.

> ***What is planning?***
>
> Planning, also known as urban, city and/or regional planning, is 'the scientific, aesthetic, and orderly disposition of land, resources, facilities and services with a view to securing the physical, economic and social efficiency, health and well-being of urban and rural communities'
>
> **- Canadian Institute of Planning, 2007**

2.1.1 Food Security- Missing in Past Planning Literature

The lack of food systems references in planning literature highlights this point[4]. Ebenezer Howard's Garden City concept (from 1902) is one of the only plans that mentioned aspects of the food system, such as production, distribution, preparation, consumption, and waste recycling. Howard's goal was to blend town with country so residents could simultaneously enjoy the benefits of the town (such as higher wages and more opportunities for employment and recreation) and the country (such as open space and fresh air). The concept called for 5,000 acres of agricultural land doubling as a greenbelt; location and flow for raw and processed food; collective kitchens and dining halls; and recycling of waste as fertilizer.

Other research that touched on the importance of the food system are Lewis Mumford (1961) and Benton MacKaye's (1962) work on regional development, Clarence Perry's neighbourhood concept that included the need for access to retail food outlets, and feminist work by Wekerle (1985), Hayden (1981, 1986), Tinker (1995, 1997) and Franck & Ahrentzen (1989) on women's role in acquiring, preparing and providing food[5].

Major planning journals, such as the Journal of the American Planning Association (JAPA), Journal of Planning Education and Research (JPER) and the Journal of Planning Literature (JPL), had no articles that discussed community food systems prior to the year 2000[6]. But, a recent review of journals in 2006 showed considerable growth of food topics in planning literature with 5 results retrieved when searching for the term "food" in JAPA, 118 in JPER and 89 in JPL. Topics ranged from food justice movements, scales and systems in planning research, strategies for urban health through combating sprawl, and establishing a community food systems approach. Sixteen publications on food and cities were also found on the International Development Research Centre website.

2.1.2 Planning Agencies- Bringing in the Rear in Food Security

Pothukuchi & Kaufman (2000) conducted a survey of 22 planning departments in the United States and found that agencies were minimally engaged in food systems planning and were 'reactive rather than proactive' and 'piecemeal rather than comprehensive'. The survey indicated that planning departments were most often involved in food system areas if they pertained to land use and zoning. Examples are location of supermarkets, grocery stores, fast food outlets and food wholesaling. Twelve out of 22 communities were involved in community gardens, but only 1 indicated that they were significantly involved.

The survey, conducted in 1997 and 1998, reflects past perceptions on the importance of food system planning by municipalities and governments. Since then, several food

policy councils in North America have been created with the goal of assessing the local food system and developing food and agricultural policy recommendations. These councils, often sanctioned through government action, such as an Executive Order, Public Act, or Joint Resolution, bring together community members, stakeholders and government officials. According to the State and Local Food Policy Council group[7], there are currently 26 councils in the United States (13 state, 11 local, 2 Native American tribal) and 4 in Canada[8].

2.1.3 Off the Planning Agenda

Food security did receive attention in historical eras of crisis and shortage of food, such as during World War II when the number of gardens in Canada and the United States nearly doubled due to fuel and economic shortages[9] but the issue has generally been a secondary priority for urban planners. Two surveys- one conducted by Pothukuchi & Kaufman (2000) on 22 municipalities in the U.S. and the other by Abel (in Clancy 2004[10]) on 16 municipalities and 7 counties in Pennsylvania- asked planners in the U.S. why food issues have not been high on their 'to-do' list. The responses were similar for both surveys:

- land use, built environment and social service are planning issues, not food systems
- food is a rural, not an urban issue
- the food system is driven by the private not the public market and therefore is out of the control of public agencies
- federal, provincial and/or local funding is absent for food planning
- there is no problem with the food system (grocery stores and supplies are abundant)
- there is a lack of a focal agency or department for food issues in the city government
- there is a lack of understanding about food systems and their importance

Definitions

Food security- "mean[ing] that food is available at all times; that all persons have means of access to it; that it is nutritionally adequate in terms of quantity, quality, and variety; and that it is acceptable within the given culture".

-Mougeot, L. (2006). *Growing Better Cities*. International Development Research Centre.

Urban agriculture- "is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city, or a metropolis, which grows or raises, processes, and distributes a diversity of food and nonfood products. It (re)uses on a daily basis human and natural resources, products, and services largely found in and around that urban area and, in turn, supplies on a daily basis human and material resources, products, and services largely to that urban area".

- Ibid.

Food system- is an "interconnected network of practices and processes that cover all aspects of food…includ[ing] food production, processing, distribution, access, consumption and recycling…exist[ing] as an interconnected set of sub-systems ranging from the household to the global level".

- Food Security Conference Workshop. (2006). *Making Urban Agriculture a Planning and Governance Priority for Cities: Experiences from Portland, Oregon and Vancouver, B.C.* Presenters: Mendes, W., Kaethler, T., Rhoads, A, Balmer, K.

2.2 Growing Interest in Food Security

City dwellers are, for the most part, disconnected from the growing and harvesting of their food and instead rely on grocery stores and restaurants. But with approximately 50% of the world's population currently living in cities[11], and 80% of Canadian residents living in urban centers[12], this leaves a huge responsibility on rural farmers to generate enough food for city residents.

While farmers in British Columbia (B.C.) do produce 48% of all foods consumed in the province (determined by 1562 million kilograms of meat, alternatives, dairy, fruit, vegetables and grains produced in B.C., and 2798 million kilograms of the same foods consumed in B.C.)[13], the remainder is primarily imported from the United States (U.S.), particularly from California's $30 billion dollar agriculture industry. This dependence on foreign suppliers for agricultural goods has been encouraged through the removal of trade tariffs in the 1989 North American Free Trade Agreement. However, to rely on foreign suppliers in California or other agricultural regions in Canada for food imports should be a concern for B.C.'s urban residents.

2.2.1 The Spectre & Spectrum of Climate Change

Climate change presents several concerns for farmers around the world. The International Rice Research Institute in the Philippines found a correlation between rising temperatures and crop yields. According to their study, conducted between 1992 and 2003, a 1-degree Celsius rise in temperature resulted in 10% lower yields for corn, rice and wheat[14]. And, a report released by the California Environmental Protection Agency, indicated that temperatures are expected to be 10.5 degrees Fahrenheit warmer by 2100[15], putting life and water supplies at risk. Even without this projected rise in temperature, Fresno County in California experienced a 21-day heat wave in 2006 that saw thousands of cows die from extreme heat. Farmers suffered from over $85 million dollars in losses on beef, dairy and poultry goods[16]. Global warming can create problems for crops, as blossoms may open too early for insects to pollinate them, and fruit trees may produce weaker crops from the fewer cooler nights required for recovering between harvests[17].

2.2.2 Water Supplies Drying Up

Failed 2006 soybean crop due to drought in Mid West United States. Photo Courtesy of Lars Plougmann.

The lack of land on which to grow food has traditionally been the biggest barrier to food production, however, Lester Brown, founder and president of the Earth Policy Institute stated in his book, *Outgrowing the Earth: The Food Security Challenge in an Age of Falling Water Tables and Rising Temperatures*, that it is the shortage of water that is today's most formidable barrier[18].

Agriculture uses 70% of all the water pumped from the ground and with water tables falling from growing industrial demand and household usage, this will make food production all the more challenging. The correlation between water scarcity and food prices was made by the International Food Policy Research Institute, which estimated that by 2025 the price of rice will rise by 40%, wheat by 80%, maize by 120%, and other coarse grains by 85%[19]. Disturbingly, few policymakers and researchers have recognized that water shortages will equal food shortages[20].

Water shortages are apparent around the world, including areas from which Vancouverites import food. One example is California. The agriculture producing valleys in central California are reliant on the snowmelt from the Sierra Nevada mountain range which provides 75% of water for their crops. The problem is that the Sierra snow pack is expected to diminish by 90% by the end of the century. Also, the snow, which used to melt slowly over the summer, is melting too quickly and leaving valleys dry by mid-summer[21]. The water crisis is not unique to California but also extends to B.C. and to Canada's western prairie provinces where damming, withdrawal of water by humans, and global warming have drastically reduced summer river flows by 20-84% since the early 1900s[22].

2.2.3 Quality Control of Food & Concentration of Production

Natrual Selections is widely known as EarthBound Farms

Quality control of food is another worry no matter where food is grown. The multi-state E. coli outbreak in August of 2006 highlights this issue. It was the 20th food poisoning episode since 1995 that was linked to spinach and lettuce grown in California. One person was killed and nearly 200 more were sickened in Canada and the U.S.[23], even though farmers in California had been previously warned by the Food and Drug Administration that they needed to do more to protect their harvest from *E. coli* contamination.

Buying food from large-scale producers in far away agricultural regions contributes to a lessened degree of food security. Bonnie MaGee, from Vancouver's Farm Folk/City Folk, stated that "the larger stores that are buying from the distributor alone aren't going to be able to source their individual products, so it gets harder to identify where the product came from"[24]. Natural Selections, an example of a large-scale producer, recalled 34 brands of spinach during the 2006 California *E. coli* scare including those packaged under their own brand name and also those packaged under other companies that buy their spinach[25]. Advocates for 'eat local' movements believe that more direct links from producer to consumer can ease concerns over tainted food products.

2.2.4 Fuel Costs & Climate Connections

Food bought and consumed by urbanites also needs to be transported to the city. In the United States, food production used "as much energy as the entire country of France with 80% of this energy used to move, process, package, sell, and store food after it leaves the farm"[26]. Also, the further food needs to travel from producer to consumer, the more fossil fuels are used and the greater the carbon dioxide emissions. The David Suzuki Foundation estimated that much of our food travels over 2,400 kilometres to get to our dinner table and that the production of the food needed to feed a family of four, including packaging and distribution, releases up to eight tons of carbon dioxide annually[27].

The relationship between carbon dioxide emissions and food miles (the distance food travels from producer to consume) was also studied in Iowa and showed "significant transportation savings and a corresponding reduction of up to 7.9 million pounds in carbon dioxide emissions if 10% more of the produce consumed in Iowa originated in an Iowa based regional or local food system"[28]. Excessive sprawl and

development over prime agricultural lands that force farmers to grow food on less productive land, further away from consumers, may be one of the reasons for these large savings in carbon dioxide emissions.

2.2.5 Buzzing Off: Crop Pollinators Vanishing

The sudden disappearance of bees across the U.S. and Europe, officially called the Colony Collapse Disorder, presents another threat to the food supply. This recent phenomenon, which began in late 2006 and early 2007 has caused bee numbers to be reduced by 10- 40% on the West Coast and 50% on the East Coast and the state of Texas[29]. Bees play an important role in pollinating the $14 billion U.S. agriculture industry. Zac Browning from the American Beekeepers Association stated that, "every third bite we consume in our diet is dependent on a honeybee to pollinate that food"[30].

Bee Farming. Photo Courtesy of Erica Olsen.

The cause for the recent Colony Collapse Disorder is unclear though theories to explain the losses include the use of new nicotine- based pesticides, loss of natural bee habitat, mite infestations, disease, suppressed immune systems and even mobile phone technology.[31] Regardless of the cause, this sudden disappearance of bees means that farmers will have to find another way to pollinate their crops or suffer reduced agricultural production, which will ultimately affect the price and variety of foods available to consumers.

2.2 6 Fertilizers Feeling the Crunch of Natural Gas Supplies

Artificial fertilizers, made from nitrogen, potash or phosphate, are widely used among farmers to keep their soils productive. About 65% of Western farmers in Canada and 54% of Eastern farmers use nitrogen fertilizers, which require natural gas (methane) in the manufacturing process[32]. For every ton of this anhydrous ammonia fertilizer, 33,500 cubic feet of natural gas is required[33]. The problem is that natural gas resources in Canada are estimated at 450 trillion cubic feet and are only expected to last another 74 years[34]. Prices for natural gas have been increasing steadily and the Canadian Gas Association predicted that Canadians will be paying 20 to 50% more by 2007[35]. This means higher fertilizer costs and increased pressure on Canadian farmers.

2.2.7 Summary

Although food production and food security have not been the most pressing issues for urban residents, this section provides several arguments for planners and policymakers to prioritize food planning in the city. Without a food plan, and particularly a food production plan, urbanites may be subject to a major crisis where prices for produce will increase drastically (similar to the increase in fuel prices), luxury imported food will be non-existent, and residents will spend

increasingly more of their income simply trying to feed themselves.

2.3 Benefits of Producing Local Food

Growing food in cities not only assures food security in the event of a crisis or shortage of food, but local food production is often associated with several environmental, economic, and social benefits. Barr (1997) described how these three areas work together to meet sustainability goals. He noted that, "we cannot achieve sustainability without addressing all three of these elements at the same time because they all have a profound effect on each other. Therefore any solutions to the problem of sustainability need to make improvements in all three areas. This is where urban agriculture offers an almost unique opportunity because it can have a positive impact in each of these three areas"[36].

Local food systems benefit the environment by reducing the amount of fuel needed to transport food to the city[37], thus improving air quality[38] and reducing carbon emissions; creating more green spaces that foster evapotranspiration to improve micro-climate in the urban center[39] and reduce urban heating/electricity demands from air conditioning[40]; reducing the ecological footprint of the city[41]; and providing a use for urban organic wastes and waste water[42].

Economic benefits of local food systems are the stimulation of micro-enterprise development[43] and a source of income for local producers[44].

The social benefits of urban agriculture are that it offers a food source for the urban poor[45]; alleviates poverty by saving on food and health expenditures[46]; provides healthier and fresher nutritional food because of the shorter distance from producer to consumer[47]; increases forms of recreation[48]; increases sense of community and belonging[49]; improves social inclusion for disadvantaged groups[50]; improves safety in neighbourhoods by creating more 'eyes on the street'[51]; and creates a sense of trust through face-to-face interaction between producer and consumer[52].

2.4 Challenges for Local Food Systems

There are many benefits to local food systems but several challenges also exist which include a lack of local processing and packing facilities[53]; competition from supermarkets; large producers and imported food[54]; lack of citizen participation due to the fact that local foods must often be sought out, and cannot always be incorporated into "one stop shopping" trips[55]; and higher prices for local produce[56].

One of the concerns for implementing urban agriculture is that projects could negatively affect the environment by contaminating local water sources if overly high inputs of chemical fertilizers and pesticides are used. Also, fragile ecosystems like wetlands and hill slopes could be used for urban food production because of competition for scarce land[57].

3.0 LOCAL FOOD POLICIES & PLANS

3.1 Vancouver's Major Players

Three major organizations- Vancouver Coastal Health (VCH), Vancouver Food Policy Council (VFPC) and the City of Vancouver Social Planning Department - work on food planning and policy making in the City of Vancouver.

Vancouver Coastal Health

Vancouver Coastal Health is the provincial health authority. Located in the population health department, food security planning is one of the strategies for creating a healthier tomorrow for communities, families and individuals. Eight local Community Food Action Initiative committees are present in Richmond, Vancouver, North Shore, Sea-to-Sky, Sunshine Coast, Powell River, Bella Bella and Bella Coola. Each Committee has completed an environmental scan, a food system assessment and gap analysis, and a 3-year action plan for their region. Funding for the development of this plan and its implementation comes from the province's Act Now initiative[58].

Vancouver Food Policy Council

The Vancouver Food Policy Council, established and approved by Vancouver City Council on March 11, 2004, brings together individuals from sectors of the local food system, including food production, processing, access, distribution, consumption and waste management to examine the operation of the food system and provide ideas and policy recommendations for how it can be improved. Their mandate is to support the development of a just and sustainable food system that fosters sustainable equitable food production, distribution and consumption, nutrition, community development and environmental health. This group wrote the Vancouver Food Charter in 2007 and some members of the council were authors on Vancouver Coastal Health's *Community Food Action Initiative Plan: Three Year Action Plan in 2006* (CFAI).

Vancouver Food Charter Principles

- **Community Economic Development**- by promoting greater reliance on local food systems to strengthen the local and regional economics, creating employment and increasing food security
- **Ecological Health**- by protecting natural resources, reducing and redirecting food waste, and contributing to the environmental stability and well-being of our local, regional, and global communities
- **Social Justice**- by ensuring that all residents have accessible, affordable, healthy, and culturally appropriate food, particularly for children
- **Collaboration and Participation-** by engaging citizens, promoting responsibility, strengthening communities and encouraging the dialogue between the community, government, and all sectors of the food system
- **Celebration**- by celebrating Vancouver's multicultural food traditions

The City of Vancouver

At the City of Vancouver, food policy and projects cross many departments such as engineering, park boards, health authorities, planning and solid waste management. Table 1 outlines municipal department responsibilities[59] at the City of Vancouver and gives a sense of how difficult it would be to organize a city-wide food production plan. The City's Social Planning Department is primarily responsible for food related projects. Two staff members were originally employed in 2003 but due to budget considerations one Food Policy Coordinator now manages City- related initiatives. Their working document is the *Vancouver Food Action Plan*, based

on the vision from the Vancouver Food Charter, to guide their policies and practices for a just and sustainable food system. This plan was created in 2003 with recent updates in 2005 and 2007.

Table 1: Municipal Departments Responsible for Urban Agriculture-type Activities in the City of Vancouver

City Initiative	Municipal Department
City Farmer garden (compost demonstration and water conservation site)	Engineering Services Solid Waste Management
Composting (city, home, apartment, backyard, and worm) and compost information hotline	Engineering Services Solid Waste Management Planning (Central Area)
Green Streets Program	Engineering Services Streets, Structures, and Greenways Planning (Central Area)
Neighbourhood and city greenways	Engineering Services Streets, Structures, and Greenways
Natural Yard Care	Engineering Services Solid Waste Management
Environmental Grants	Financial Services
Greenhouse gas reduction	Office of Sustainability
Community Gardens	Parks Board Real Estate Planning (Central Area) Engineering Services
Farmer's Markets	Parks Board
Fruit and Nut Trees	Parks Board Planning and Operations Planning (Central Area)
Green building strategy	Planning (Central Area)
Childcare grants (includes food supplement program, etc.)	Social Planning
Aboriginal initiatives (UBC Farm Community Kitchen garden)	Social Planning
Social sustainability initiatives (farmers markets, community gardens, edible landscaping, etc.)	Social Planning
Food system assessment	Social Planning
Food policy staff team	Social Planning

Source: Mougeot, L. (2006). *Growing Better Cities*. International Development Research Centre.

3.2 Who's Doing What in Vancouver

The previous section noted that the two major plans for food security are the Vancouver Food Action Plan (VFAP) by the City of Vancouver, and the Community Food Action Initiative (CFAI) by Vancouver Coastal Health. A Vancouver Food System Assessment also exists however much of the information found in the document is incorporated into the CFAI. The VFAP and the CFAI differ in that the VFAP[60] focuses on "areas that are within the jurisdiction of the City of Vancouver" such as design strategies, re-zonings and creating urban agriculture guidelines; and the CFAI takes a broader approach and implements a variety of programs to "increase food security for BC residents with a focus on vulnerable populations"[61]. Specific examples of action items are found in Table 2 below:

Table 2: Examples of Action Items & Goals

City of Vancouver- VFAP	Vancouver Coastal Health- CFAI
• Facilitate creation of farmers' markets	• Support local farmers, through farmers' markets and cooperative buying
• Develop new community gardens in Mt. Pleasant, Kits, Arbutus	• Support community gardens and kitchens
• Create urban agriculture guidelines for edible landscaping and inclusion in the Green Building Strategy	• Provide funding for urban agriculture projects (community or rooftop gardens) for vulnerable populations, focusing on neighbourhoods that currently have no gardens
• Expand food producing and education garden near City hall	• Reestablish the Good Food Box[62]
• Conduct inventory of under utilized City owned properties	• Organize a network of food providers, including charitable providers to create a local food buying club and improve coordination
• Work with local organizations on strategies to decrease food going to landfill	• Create affordable or subsidized restaurants in social housing and/or neighbourhood houses

The action items and goals of these two organizations are complementary since Food Policy Council members work closely with the City and were a large part in the creation of the CFAI. While the City facilitates the development of farmers' market through changes in zoning, Vancouver Coastal Health supports programs that encourage the use of farmers' markets by vulnerable populations, and a system of transportation to and from the markets. Another example of collaboration is the City's development of more community gardens using funds from Vancouver Coastal Health. The groups also have projects that are independent of each other such as the City's development of urban agriculture guidelines for edible landscaping, community gardens in private developments, and the Green Building Strategy for high and medium density buildings. Vancouver Coastal Health's CFAI, on the other hand, recommends supporting programs that teach children in inner city schools about growing and preparing food, and developing standards for donated food.

3.3 Summary

Although these actions do improve food security in the City, there are major pieces that need to be examined and included for a holistic view of food policy planning. For instance, there is no mention of how much land is needed for an individual's food consumption requirements, nor is there an initiative to maximize food production in urban agriculture projects or a plan to provide any projects with water, tools and labourers.

The previous plans assume that developing more community and rooftop gardens will contribute to the food security of vulnerable populations. But if these gardens are not focused on maximum food production within each garden plot, then the gardens will not produce enough food to significantly affect a person's food security. Other benefits, such as increasing the sense of community, may be achieved but taking into account what we know about peak oil, water shortages and climate change, and how they affect our food supply, any land available in a city must be devoted to producing food for city residents.

The following section examines the City's self-reliance- the degree to which the City can support its food needs- and presents an outline of a plan to maximize food production in and around the city.

4.0 FOOD PRODUCTION PLAN

In this section, I present a framework for a food production plan in the City of Vancouver. This plan builds on the work of previous food action plans and outlines 6 different areas that need to be examined if the City decides to make food production within city limits a priority.

These 6 areas are:

(1) Who Needs this Planning?
(2) What is the Food Production Target?
(3) Where Will We Grow this Food?
(4) How Will We Grow It?
(5) Who is Going to Do It?
(6) What About Tools & Machinery?

I will explore each of these sections by assessing the situation in Vancouver if the data is available, presenting examples and ideas from other cities, and offering recommendations for how the City of Vancouver can introduce serious food production into their city plans.

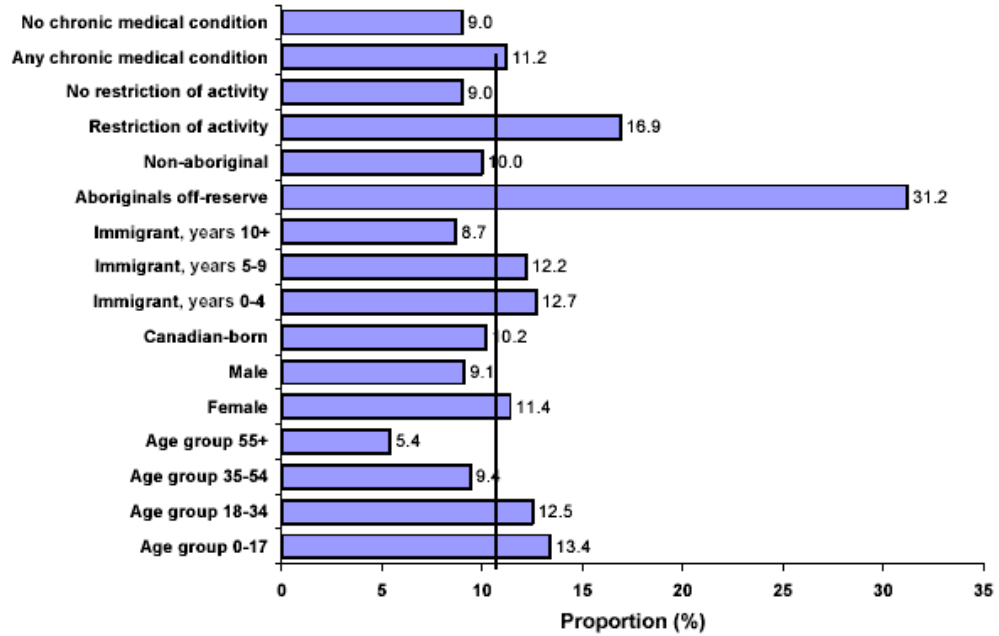
4.1 CONSIDERATION 1: WHO NEEDS THIS PLANNING?

Any person living in the city who experiences some degree of food insecurity- that is, if as a direct result of not having enough money, a person compromises on the quality of food, worries about not having enough to eat or does not have enough to eat[63]. In Canada this represents nearly 15% of the population[64] or 3.7 million persons; and 17%[65], or approximately 700,000 residents, in British Columbia.

But, in the near future, a significantly higher percentage of Canadians will become food insecure due to the fact that "the food economy is really an oil- based economy"[66]. The effects of peak oil will affect the price, availability and variety of the food supply and more and more Canadians will need a plan to grow a proportion of their food themselves to increase their food consumption and cut down on their food costs. Already, the number of Canadians that answered affirmatively in a survey that they experienced an incident of food insecurity in the last 12 months rose from 10.2% in 1998/1999 to 14.9% in 2000/2001[67].

Certain groups are more vulnerable than others, particularly children, persons suffering restriction in activity, recent immigrants, and aboriginals living off reserve. Figure 1, based on 1998-1999 data when Canadian food insecurity was just over 10%, shows the groups that experienced a greater than average degree of food insecurity[68].

Fig. 1: Proportion of food insecure households, by demographic and health characteristics of the respondents, Canada, 1998-1999



Note: The vertical line indicates that the proportion in Canada was 10.2%.

Source: NPHS, 1998-1999

4.1.1 Who's Hungry in a City of Plenty?

Strathcona/Downtown East Side, Grandview-Woodlands, Downtown and Renfrew-Collingwood were found to be the four most food insecure neighbourhoods in the City of Vancouver[69] based on socio-economic indicators such as the percentage of persons that are low-income, unemployed or receive social assistance. The total number of food insecure residents is not found in either of the City's food action plans or the Vancouver Food System Assessment document but instead the food insecure population is reported as a mixture of counts and percentages.

For example:

- 59% of homeless youth 19 years of age and younger, and 49% of those between 19 and 24 reported being hungry because of lack of food at least once a month.
- In 2000, the number of injection drug users (IDUs) living in the Downtown Eastside was estimated to be 4,700. IDUs are more likely to be food insecure.
- More than one quarter (27%) of Aboriginal people living off reserve reported at least some food insecurity and 24% experienced a compromised diet.
- One out of five people in BC who are HIV positive were food insecure.
- 12.7% of very recent immigrants (0 to 4 years in Canada) were food insecure.

While it is useful for these reports to highlight the groups and neighbourhoods that are food insecure, the *total* number of food insecure persons is needed to give planners and policymakers a better idea of how many residents require food planning, sources and assistance.

More detailed information was gathered on the total number of food insecure persons, using the groups of people identified by Human Resources and Skills Development Canada (HRSDC) and the Vancouver Food System Assessment as being vulnerable to food insecurity.

Unemployed:

- 2001 Census data showed the unemployment rate in Vancouver at 8.3%.
- This amounts to a total of 45,290 unemployed persons that experienced food insecurity[70].

Low Income:

- Health Statistics Canada reported that 44% of low-income persons experienced food insecurity[71].
- With 407,140 persons listed in the 2001 Census as "low income persons among the population living in private households" in Vancouver[72], there is approximately 179,142 low-income food insecure residents.

Lower Levels of Education

- 2001 B.C. Stats listed 169,115 persons 20+ years of age that have less than Grade 9 education, some high school, high school graduate, or a trades certificate[73].

Poor Health

- A 2007 study by researchers at Simon Fraser University found that 12.9% of Vancouver residents self-reported poor or fair health[74] which is 70,392 persons.

Recent Immigrants

- Vancouver's recent immigrants make up 9.8% of the population[75], or 53,475 persons.
- The Vancouver Food System Assessment stated that 13% of recent immigrants are subject to food insecurity[76], therefore, there is a total of 6,952 recent immigrants that experienced food insecurity.

Aboriginals Living Off Reserve

- Health Canada estimated that 31% of aboriginals living off reserve experience food insecurity[77].
- The Vancouver Community Food Action Initiative counted 10,500 aboriginals living off reserve in Vancouver[78], thus 3,150 of these residents experienced food insecurity.

Seniors

- The City of Vancouver had 70, 340 seniors in 2001[79].
- 7% of seniors responded in the Health Canada survey that they experienced food insecurity[80]. 7% of the 70,340 seniors in Vancouver is 4,924.

Live in Single Parent Families

- B.C. Stats showed 22,825 lone parent families in Vancouver.

Homeless

- The Vancouver Community Food Action Initiative counted 1,310 homeless persons[81].

Street -Involved Youth

- Covenant House Vancouver, a non-profit agency that provides shelter and services to homeless youth, counted 500-1000 youths on the streets on any given night throughout the year[82].
- An in-house survey showed that 70% of youth were 'hungry a few times', and 40% 'often went without food'.

Intravenous Drug User

- The Vancouver Community Food Action Initiative counted 4,700 injection drug users in the Downtown Eastside.

Activity Limiting Disabilities

- A Profile of Disability by Statistics Canada in 2001 showed 530,130 persons with physical disabilities in B.C. (Included disabilities due to a health-related condition or problem that limit everyday activities such as hearing, seeing, speech, mobility, dexterity, learning, developmental delay, developmental disability or disorder, psychological, chronic condition or other).
- If 14% of B.C. residents resided in Vancouver, then there were approximately 72,098 persons with activity limiting disabilities.
- The Vancouver Community Food Action Initiative estimated that 25% of persons with disabilities, aged 15-34, experienced food insecurity. Therefore, 25% of 72,098 is 18,025 persons with activity limiting disabilities that experienced food insecurity.

A total count of food insecure persons is challenging due to considerable overlap in these categories (for example, street involved youth can also have lower levels of education). There was no information found that would assist in estimating the overlap, however, the information presented above gives more details on the food-insecure population.

Although an accurate count cannot be calculated, Statistics Canada stated that 17% of B.C. residents were found to be food insecure. With approximately 14% of B.C.'s population living in Vancouver[83], the estimated of the number of food insecure residents in Vancouver is **97,900**.

This estimate acts as a starting point from which planners can begin planning for persons who compromise on the quality of food, worry about not having enough to eat, or do not have enough to eat.

4.1.2 Recommendations

1. Reserve 50% of Plots in New Community and Rooftop Gardens for Food- Insecure Persons

The City of Vancouver has the opportunity to provide greater food security for vulnerable groups in the "2010 New Community Shared Garden Plots By 2010" initiative. This challenge was put forth on May 30, 2006 by Councilor Peter Ladner who called for the City to encourage the establishment of 2010 new garden plots by January 1, 2010 as an Olympic legacy.

Also for the upcoming Olympics, the City released a 2010 Games Inner-City Inclusive Commitment Statement to promote social and economic sustainability in all activities leading up to and during the 2010 Games for a variety of groups such as those persons that are low and moderate income, aboriginal, women, youth, immigrants, people with disabilities and people of colour. Considering that the City of Vancouver has an estimated 97,900 food insecure residents that are also from similar demographic groups, the City could reserve at least half of the new plots for these food insecure persons to meet the goals of the Inner-City Inclusive Commitment Statement and offer the other half to other Vancouver residents.

Furthermore, the City of Vancouver could first develop gardens in the four neighbourhoods (Strathcona/Downtown East Side, Grandview-Woodlands, Downtown and Renfrew-Collingwood) found to be the most food insecure to increase and ease access for persons experiencing food insecurity.

A plan to target these food insecure groups, engage their interest in using the gardens and provide education on farming methods is also needed.

2. Create a Priority Waiting List in Current Community Gardens

Food insecure persons that want access to Vancouver's 18 community gardens (950 plots total) must put their names on waiting lists, one of which is 70 persons long. The majority of these gardens are run by the Vancouver Parks Board, the City of Vancouver Engineering Department Greenways Branch, and the Vancouver School Board. These groups can create a priority waiting list for each current community garden that would allow food insecure persons quicker access to plots. Once this list is created and a plot becomes available, persons on the priority wait list could be alternated with persons on the current wait list. This system of rotation would give food insecure persons earlier admittance to garden plots while still respecting persons on the original wait list who also want a chance to grow food.

4.2 CONSIDERATION 2: WHAT IS THE FOOD PRODUCTION TARGET?

Ideally, the City would be 100% self –reliant in food production. This would mean that 100% of the food we eat is grown, harvested and consumed within city limits and meets the food needs of Vancouver's 578,000 residents. This, however, is an unattainable goal. This section examines why 100% self-reliance is not possible in Vancouver and looks at the degree of self-reliance in the province and in other cities around the world. A discussion on the goals for a food production target in the City of Vancouver follows.

4.2.1 Food for a Small Portion of Vancouver's Residents

There was no data found for self-reliance in the City of Vancouver. However, the 2006 Ministry of Agriculture and Lands report, *B.C.'s Food Self Reliance: Can B.C.'s Farmers Feed Our Growing Population*, estimated that approximately 6 city lots, or 0.524 hectares of land (10% of which needs irrigation) are required to produce food for one person's annual consumption[84].

If the amount of land needed for per capita self-reliance (0.524 ha= 0.00524 km^2) is applied to the entire land area of Vancouver (115 km^2), the area could support a mere 22,000 residents. This is approximately the number of people that currently live in the Dunbar neighbourhood and half the amount of people that live in the Downtown area[85]. This is a best-case scenario where all 115 km^2 of land in Vancouver is arable, used for agriculture and can be sufficiently irrigated. In other words, even if all the rooftops, park spaces, roads, etc. were used as food growing gardens, the land area- using today's agricultural production technologies- could only provide enough food for one year for 3.8% of the population.

Aerial of Downtown Vancouver. Photo Courtesy of Matt Musselman.

4.2.2 British Columbia Relying Partly on British Columbia

In the *B.C. Food Self Reliance* report, B.C. farmers produced a total of 1562 million kg of grain, fruit, vegetables, meat and alternatives, and dairy products while B.C. residents consumed a total of 2798 million kg of these products. Thus, B.C.'s degree of self- reliance was calculated at 56%.

The report also showed that to provide for the entire B.C. population, farmers would need 2.15 million hectares of land, of which 10% (215,000 hectares) requires irrigation. This is only 2.3% of B.C.'s entire land area and roughly half of the land in the protected provincial Agricultural Land Reserve- though much of this land is private, unproductive and located in northern regions. Projected populations estimate that by 2025, farmers will need 2.78 million hectares of land and must increase their production by 30% to keep this same level of self-reliance.

4.2.3 Cities Around the World Reporting Some Self-Reliance

Case studies from other urban cities around the world indicate that the City of Vancouver can vastly improve food production within city limits.

The only noteworthy example of an urban food -producing municipality in Canada is the City of Burnaby although the exact type and amount of food produced is unclear. The Toronto Food Policy Council reported that this city grew 10% of all the vegetables in the Fraser Valley on 70 hectares of farmland[86] based on information found in the City of Burnaby's 1987 Official Community Plan. But, the current Official Community Plan states that farms in the city represent *'a significant percentage'* of the vegetable production in the Lower Mainland and does not present an exact number. If the City of Burnaby does in fact produce 10% of all the vegetables in the Fraser Valley, then this is the only case where significant food is produced in a Canadian city.

Singapore is relatively self sufficient in poultry, pork and eggs (80% self-reliant in poultry, 100% self-reliant in eggs and pork production) on its tiny land area of 704 km^2[87]. They use 70 km^2 of their land area to produce 25% of the vegetables they eat and 10,000 farmers work to produce this food for the city (Determined by the number of licenses issued by the Singapore Primary Production Department of the Ministry of Agriculture to horticulture (fruit, flowers, ornamental plants, and vegetables) and mari-culture (marine organisms) farmers[88]).

Hong Kong, Shanghai, Katmandu and Karachi all produce respectable proportions of their food supply. Hong Kong produces 15% of the pork, 45% of the fresh vegetables, and 68% of live chickens it consumes. Kampala is 70% self-reliant in poultry, Kathmandu is 30% self-reliant in fruit and vegetables, Calcutta produces 10% of their daily fish consumption, and Karachi produces 50% of all their vegetables[89]. It must be emphasized that cities, rather than provinces or even regional areas are producing these proportions of the food consumed in the city.

Though these cities report high levels of production in some areas, caution must be used when examining the degree of self-reliance. For instance, Singapore may be nearly self sufficient in poultry, but the feed for chickens may not be factored into the self-reliance equation. Also, a better measure of self-reliance is the total amount of goods consumed (ie. All the fruits, vegetables, meat, etc.) compared with the total amount of goods produced. A city may produce 50% of their fruits and vegetables, but if fruits and vegetables only make up 10% of the food they consume, then they are not 50% self reliant.

Chickens Living in the City. Photo Courtesy of Nir Nussbaum.

4.2.4 Food Production in Vancouver- Why Bother?

Though 100% self-reliance is not feasible, the City of Vancouver can do better in the amount of food produced in the urban centre. Van Bers (1991) stated that a viable target for Canadian cities is to produce 20% of all fruit and vegetable requirements. This is based on 15, 265 hectares of land made available for production (more than Vancouver's total land area of 11,500 hectares or 115 km^2), and assumes that one square metre yields an average of 10kg of vegetables and fruits in an urban garden over a five- month growing season[90]. Seeing as Vancouver does not have 15,265 hectares of land available, Vancouver would not be capable of producing 20% of all fruits and vegetables. If 7633 hectares of city land were made available, using Van Bers calculations, 10% of fruit and vegetable requirements could be met. Research is needed to determine reasonable food production targets in the City of Vancouver based on the amount of land and its production capability that are available and can be used towards growing food.

If Vancouver can only reasonably expect to grow less than 20% of all fruit and vegetable requirements, then why bother with all the effort in establishing and developing areas of land for food production?

The City of Vancouver.

Several environmental, economic and social benefits exist for local food systems as discussed in Section 2.0. Also, there are still carbon dioxide savings from growing food locally and reducing the need for transportation of goods to and from the city. The findings from Iowa in Section 2.2.4 showed a reduction of 7.9 million pounds of carbon dioxide emissions if 10% more of the produce consumed in Iowa originated in an Iowa based regional or local food system.

Also, food production in the city could provide primarily for the 97,900 food insecure residents. As the cost of food increases due to fuel shortages, missing bees and more expensive artificial fertilizer for crops (to name a few reasons), food insecure residents may need to depend on gardens to grow some portion of their food, reduce the amount of money spend on food costs, and act as a form of employment. Vancouver Coastal Health reported that nearly half of Milwaukee community gardeners saved between $100-$300 per season from the food they grew, and Philadelphia gardeners saved $700 per family per year[91]. As food prices increase, the value of food grown in urban gardens will also increase.

As well, the City of Vancouver is already taking steps to incorporate more urban agriculture projects throughout the city. So, recognizing that there are many threats to the food supply, there is a strong argument to be made that the future 2010 garden plots and other urban agriculture initiatives in the City should be focused on maximum food production.

Finally, even though there is not much undeveloped land for growing food in Vancouver, this does not mean that Vancouverites cannot contribute to local food production. Vancouver residents can farm on the outskirts of the city and in suburban areas.

4.2.5 Recommendations

1. Determine Food Productions in the City
Presently, there is no estimate of how much food or what kind of food is produced in community and rooftop gardens, on patios or in backyards. Surveying community gardeners and logging an approximation of the type and amount of food grown would be one way to assemble this information. Each governing group of a community garden (Vancouver Parks Board, the City of Vancouver Engineering Department Greenways Branch, or the Vancouver School Board) could gather this information when collecting annual plot or membership fees. To determine the amount of food produced in other areas, such as patios and backyards, a section on the City of Vancouver's Food Policy website could allow visitors to input their approximate annual food production and crop.

2. Determine Food Consumptions in the City
Once food consumption is determined, a goal can be set as to how much and what type of food should be produced in the city. Food consumption can be measured by evaluating supermarket purchases and restaurant sales. Also, since one aspect of food security is ensuring that all persons have food that is culturally appropriate, Vancouver's diverse ethnic population requires attention to determine the type of food that is acceptable and appropriate for these cultures.

3. Calculate Vancouver's Food Self-Reliance & a Reasonable Food Production Target
Using the information gathered on food production and consumption, food self-reliance can be measured. This information can be updated annually to track the increasing level of self –reliance and decreasing dependence on imported food. A reasonable food production target should also be determined based on the land available (including rooftops) for growing food.

4.3 CONSIDERATION 3: WHERE WILL WE GROW THIS FOOD?

As much as possible, food would be produced in the City- on rooftops, undeveloped land, vertically, and in adjacent waters. This section examines the land available in and around Vancouver and explores options to grow food on the outskirts of the city.

4.3.1 Pockets of Land in Vancouver

The City of Vancouver is located on 114.7 km^2 of land, most of which is developed with roads, office towers, homes and businesses.

Land that could be used for food production in the City of Vancouver was identified in a 2007 inventory of undeveloped and underused lands. The study looked at public and quasi public lands such as those belonging to schools, libraries, fire halls, hospitals, community centers, parks, churches, and city owned properties in all 22 Vancouver neighbourhoods[92]. A total of 639 sites (the total land area was not calculated) were identified with the largest number of potential sites located in Renfrew-Collingwood (55 sites), followed by Hastings Sunrise (53), Kensington Cedar Cottage (49) and Downtown (41). Table 3 shows the distribution of sites and the property owners. More research is needed to determine the exact land area of each site, the soil quality, leases or permissions from property owners to garden on the site, and water access.

1943 Victory Garden in front of San Francisco City Hall for food production during World War II.

Photo Courtesy of Amy Franceschini.

Table 3: Potential Urban Agriculture Sites

Neighbourhood	Park sites	Engineering sites	Capital asset/ property endowment sites	School sites (public and independent)	Church sites	Other sites	Total sites
Arbutus	9	2	0	3	5	1	**20**
Downtown	9	1	25	0	0	6	**41**
Dunbar	8	1	0	8	3	3	**23**
Fairview	6	2	14	2	3	3	**30**
Grandview - Woodlands	14	1	4	6	3	1	**29**
Hastings-Sunrise	12	2	9	6	7	17	**53**
Kensington - Cedar Cottage	12	5	15	12	3	2	**49**
Kerrisdale	7	1	2	4	4	1	**19**
Killarney	14	2	7	4	6	1	**34**
Kitsilano	18	0	2	5	2	3	**30**
Marpole	12	1	5	4	1	4	**27**
Mount Pleasant	7	2	3	4	1	3	**20**
Oakridge	6	0	0	4	5	3	**18**
Renfrew-Collingwood	13	3	25	10	2	2	**55**
Riley Park - South Cambie	10	5	4	7	3	9	**38**
Shaughnessy	4	0	1	6	3	1	**15**
Strathcona	9	1	13	2	3	1	**29**
Sunset	7	1	4	6	10	3	**31**
Victoria-Fraserview	7	7	5	8	6	4	**37**
West End	5	1	1	2	1	1	**11**
West Point Grey	20	3	1	2	3	1	**30**
Total	**209**	**41**	**140**	**105**	**74**	**70**	**639**

Source: Chiang,M., Tatebe, K., Wilmot, S. (2007). *Inventory of Urban Agriculture Lands in Vancouver*. Prepared for the City of Vancouver, Social Planning Department.

Note: Capital Assets, Parks, and Engineering Sites all belong to the City of Vancouver.

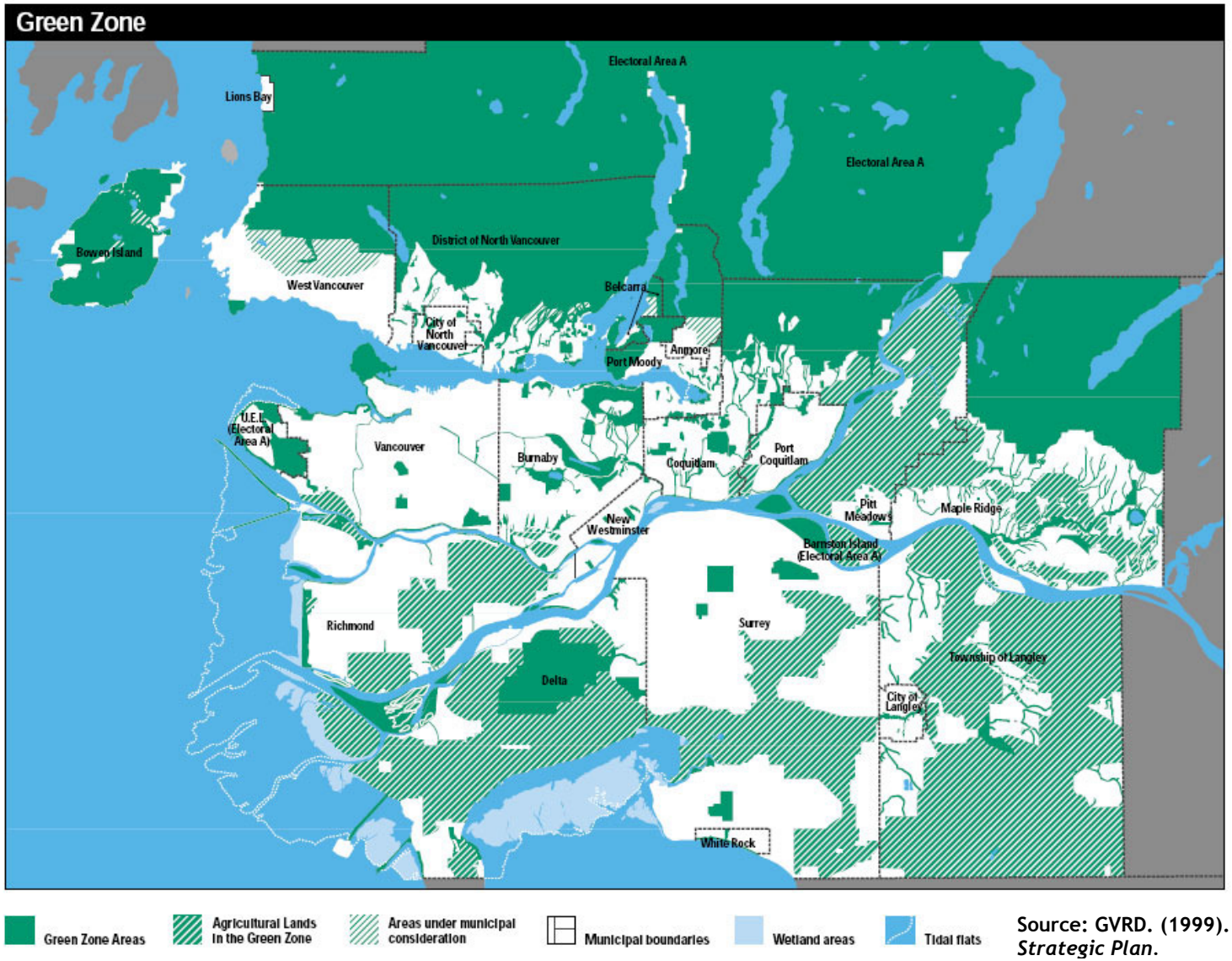
4.3.2 Can the Agricultural Land Reserve Provide for Vancouver?

There is land set aside by the province for agricultural purposes in the Agricultural Land Reserve (ALR). At the end of 2003, there was 4.76 million hectares in this reserve spread throughout the province. But, much of this land is privately owned and not considered to be the most productive for agricultural purposes. The group, West Coast Environmental Law, noted that, "for each hectare of prime agriculture land included in the ALR in the past 30 years, 2.8 hectares of prime land were excluded"[93].

Greater Vancouver only has a very small proportion of this land at 1.3% or 61,670 hectares and the nearby Fraser Valley has another 3.3%, or 159,097 hectares. The majority of ALR lands are found far from the GVRD with 32%[94] located in the Interior region (Cariboo, Central Coast and Thompson-Nicola) and roughly 50%[95] located in the North (Bulkley-Nechako, Fraser-Fort George, Fraser-Fort George, Kitimat-Stikine, Northern Rockies, Peace River and Skeena-Queen Charlotte). Figure 2 shows Vancouver's share of ALR land[96].

Regardless if ALR land can be used to produce food for the province, there are still high fuel and energy costs in the moving, processing, packaging, selling, and storing of food after it leaves the farm and travels to the City of Vancouver. The shortest distance between the City of Vancouver and the Cariboo area in the Interior region is at least 370 km[97] in a straight line. The Peace River district, which itself has the largest tract of ALR land at 31%, is at least 757 km from the City of Vancouver. Therefore, a dependence on ALR lands found outside the GVRD for food production would still require high fuel and energy costs.

Figure 2: Agricultural Lands in the GVRD



Source: GVRD. (1999). *Liveable Region Strategic Plan*.

4.3.3 Farming on the Fringe

Lacking enough land area in Vancouver to provide for all residents, peri-urban areas- places that "span the landscape between contiguous urban development and rural countryside, has low population density and encompasses a mix of land uses[98]- such as parts of the Greater Vancouver Regional District (GVRD) and the Fraser Valley Regional District (FVRD) may present additional food production locations. In 2001, agriculture in the GVRD accounted for 30% of B.C.'s gross farm receipts[99], and the FVRD generated another 32%[100]. Globally, the peri-urban area supplied 15% of all food consumed in the urban core[101].

The case studies presented from Tanzania, Russia and Canada offers ideas for peri-urban farming.

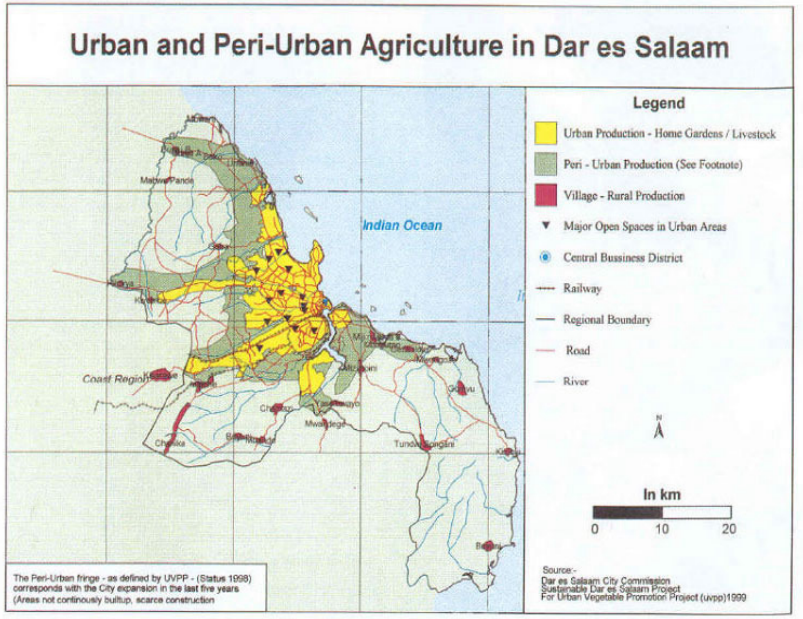
Dar es Salaam, Tanzania

Dar es Salaam is the largest urban city in the East African country of Tanzania. There are 3 million residents living in an area of 1550 km^2, 200 km^2 of which form the intra-urban centre. Agriculture in the city generates income and reduces costs for residents but because there is not enough land in the urban center for food production, the peri-urban region acts to supplement the food supply.

This region extends 15 to 25 km from the city's center but as the city expands with a population growth rate of 8%, the peri-urban region will likely be pushed further from the urban core. Figure 3 shows the urban agriculture region in yellow and the peri-urban region in green.

An interesting idea that can be derived from the Dar es Salaam peri-urban model is the type of food that is produced in each of the agricultural zones. The intra-urban area supplies perishable goods such as leafy vegetables and milk; the peri-urban area produces a mix of perishables, fruits, nuts, vegetables (sweet and hot pepper, eggplant, okra) and staples (maize, rice, cooking bananas and cassava); and rural areas produce major staples[102]. Thus, any food that cannot withstand transport to the city without refrigeration is produced closer to the center for quicker distribution. This idea of producing certain crops in the urban core, peri-urban and rural zones can be brought to Vancouver when planning for the city's food production.

Figure 3: Urban & Peri Urban Agricultural Zones in Dar es Salaam



Source: Jacobi et al. (2000). *Urban Agriculture in Dar es Salaam: Providing an Indispensable Part of the Diet*. Resource Centre on Urban Agriculture and Forestry.

Russia Dachas

The Russian dacha gardens are also an example of peri-urban land use. The dachas (urban gardening plots between 0.05 and 0.06 ha) and subsidiary plots (rural plots up to 0.5 ha) are impressive in number, the small size of plots, the virtual absence of machinery, and harvest yields. Emerging from food shortage fears in World War II, the Soviet government initiated the dacha and subsidiary plot movement in 1941 by allocating gardening plots to urban dwellers on the outskirts of the city[103].

This movement has grown so much that in 1999 approximately 71% of the Russian population owned and cultivated either a dacha or a subsidiary plot. Of these, 50% were urbanites that averaged round trip travel times to their dachas of between 1.5 to 4 hours. On average, each urban residing adult spent 555 hours a season working their dacha and each rural residing adult spent 18 hours a week in their plot. Most of these dacha farmers also held full time jobs in the city and tended to their plots on weekends and during vacations.

Food production in the dachas is exceptional and comprises 40% of the country's agricultural output. Using no till cultivation methods- a farming technique that eliminates tillage or disturbance of the soil when planting seeds, removing weeds, and mixing fertilizer- residents were found to be "consistently growing bumper crops of vegetables (e.g., harvesting 2.5 tons of potatoes from a 150 square meter plot) and it is not unusual for a family of four to satisfy all of the family's needs in potatoes and other vegetables, fruits and berries, and — for rural residents — milk, eggs, and meat — from the plot they cultivate" [104].

Suburban Backyards

Wally Satzewich, Canadian farmer and developer of the SPIN farming method (further discussed in section 4.4.1), began his operation by renting out the 'back forty from residential homeowners, ploughing their lawns under and then turning tens of thousands of dollars in profits selling the high-end produce cultivated by hand'[105], and paying rents that ranged from $100 to $200 per yard per summer. SPIN Farming stands for S-mall P-lot IN-tensive and is a method that adapts commercial farming techniques to plots that are less than 1 acre or 0.4 hectares.

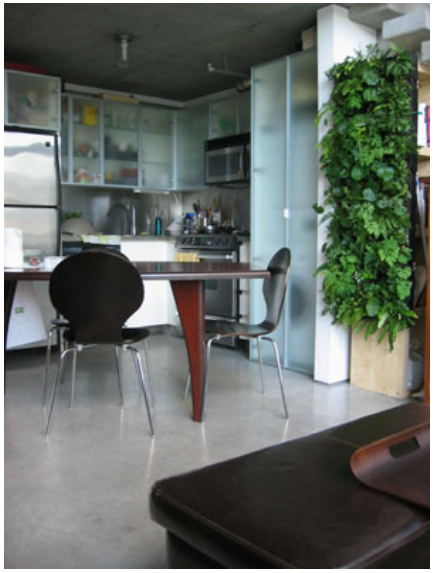
Front Yard Gardening in Vancouver.

This method has garnered accolades by the media and sustainable agriculture organizations because of its organic farming model and surprising revenues of over $50,000 dollars in sales from a half-acre of land growing common

vegetables such as carrots, spinach, lettuce salad mixes, beets, chard, cucumbers, tomatoes, beans, radish, scallion, fresh herbs, summer squash and garlic[106].

Other success stories from farms using the SPIN model include: on a 5,000-square-foot, part-time, hobby-farm model generated $10,000 to $20,000 in gross annual sales; a 20,000-square-foot, intermediate, full-time farm model generated $54,000 annually; and a 1-acre, full-time model grossed $50,000 to $65,000 annually[107]. The City of Philadelphia has also embraced this technique as a way to maintain green spaces, prove that urban farming can be a practical profession and to show its residents that anyone can apply this method. Last year, the city netted $48,000 on a half-acre of land[108].

4.3.4 Vertical Surfaces: Indoor and Outdoor



Private Residence - Vancouver, B.C.
Photo from ELT Living Wall website Source:
http://www.eltlivingwalls.com/livingwall-projects.html

Vertical walls can also be used as a food production area. The ELT Easy Green Living Wall, created in Ontario, Canada, allows a variety of plants and herbs to be grown on outdoor or indoor surfaces such as apartment walls, roofs, sides of buildings and doors. Plants are either pre-grown or planted in living wall panels made of high-density polyethylene plastic. These panels are modular and can be fitted together to make the wall larger. Irrigation starts from the top of the system and water flows through the panels without pulling soil along with it. One panel is 50cm x 60cm x 6.4cm in size and costs $40.

Home Exterior
Photo from ELT Living Wall website.

Individual vertical wall panels may not yield enough herbs or vegetables to make a notable difference in a person's food security. However, growing and selling fresh herbs on larger panels or areas can potentially have financial gains. The Fairmont Waterfront Hotel in Vancouver has a 2,100 square foot herb garden on their roof that supplies the hotel restaurant. The cost of converting the roof to an herb garden was $25,000 and the annual food production is listed in dollar values- at $25,000 to $30,000 a year. In a perfect situation, assuming that a relationship was developed between an individual producer and a restaurant, the set up costs of the garden could be paid, the undisclosed quantity of herbs grown on a 2,100 sq. ft area were valued at $25,000, and a farmer could find 2,100 sq. ft for herb production, this could be a way to generate income for the urban gardener. The idea of linking urban gardeners with local restaurants is worth further investigation to determine its viability.

4.3.5 Recommendations

1. Map Vancouver's Food Shed

Two recommendations from the previous section were to determine the production and amount of food consumed in the city. Since the production amount is minimal, this recommendation suggests mapping the origins and destination of food that is consumed in the City of Vancouver. If food production locations are determined, a movement to encourage purchasing food from the closest producers can be made to reduce the miles that food travels from the producer to the dinner plate. Also, food that has the greatest food miles could be assessed for its feasibility to be produced within city limits.

2. Establish Farms that Produce Perishable Goods Nearer to Urban Centers

Using the Dar es Salaam model, perishable goods should be prioritized in the urban center; a mix of perishables and staples should be grown in the peri-urban zone; and staples should be imported from rural areas. The 2006 agricultural census data reported that 21% of GVRD farms are greenhouse, nursery and floriculture; 28% are other animal farms (other than pig, dairy, beef, poultry but including apiculture to sheep, goat and horse farms); 14.5 % are fruit and vegetable farms; and 15.7% are organic products[109]. But, farms in the GVRD that raise 'other animals' offer an opportunity to establish and produce more perishable goods closer to the urban center. These farms represent a large portion of total GVRD farms (28%) but only account for a very small proportion of gross farm receipts (5.2%). Fruit and vegetable farms, on the other hand, represent 14.5 % of GVRD farms and are the second highest grossing farm type (at approximately 17%) in the GVRD after greenhouse, nursery and floriculture farms. The substitution of 'other animal farms' with more fruit and vegetable farms could result in both higher farm receipts for farmers and the production of perishable goods closer to the city to reduce fuel and energy costs.

3. Cease Removal of Land from the ALR

Although the total ALR area has remained fairly constant since 1974[110], "low-productivity land is being added in the north while good land is coming out in the south"[111]. This extremely productive land near the city is essential for the food self-sufficiency of urbanites. Therefore, removal of all ALR lands around the GVRD should be avoided.

4. Examine Locations and Feasibility of Peri-Urban Farming

Peri-urban areas offer larger tracts of land for food production. Research on viable locations for peri-urban farming is needed, including the use or rental of suburban backyards. An initiative by City Farmer called "Sharing Backyards in Vancouver'[112] matches people who are looking for space to farm with others who are offering space to farm. This initiative can benefit from greater publicity to increase awareness of the program and to encourage landowners to allow farming in their backyards. Also, the willingness of Vancouverites to farm and travel to peri-urban areas to grow their food must be determined.

5. Explore Mari-Culture Options

The City of Vancouver is adjacent to the Strait of Georgia and the water body offers options for marine food production. Cultivating this area for oysters, shrimp, mussels and fish will add to Vancouver's food self-reliance. A test mari-culture site is needed to determine the type of seafood that can be farmed in Vancouver waters and their potential yields.

4.4 CONSIDERATION 4: HOW WILL WE GROW IT?

This section offers ideas for maximizing food production in the city. No till cultivation and SPIN Farming are presented as two low-tech farming methods. Following a disclaimer on the problems with using technical substitutions for nature, OrganiTech and the Vertical Farm concept are offered as two high-tech ideas for future food production.

4.4.1 Low Tech Farming

No Till Cultivation

In conventional farming, the soil is regularly turned over to remove weeds, mix in fertilizer, prepare the soil for seeds and shape rows. This process of tilling contributes to soil compaction, topsoil erosion, loss of organic matter, and disruption of soil microbes. Tilling also releases carbon into the atmosphere. Current research explores whether untilled agricultural lands can be used as carbon sinks to lower atmospheric carbon dioxide[113].

No till cultivation uses herbicides to control weeds, grows crops that are not affected by packed soil, uses special equipment to reduce disturbance to soil when planting seeds, and allows crop residues to decompose on the soil after harvest. Compared with conventional methods, no till cultivation is found to increase the net return per hectare by 50%, increase production by 10%, reduce use of limes, pesticides and fungicides by 50%, reduce use of other chemicals by 10%, reduce soil erosion by 50%, and retain 4 times the carbon[114].

SPIN-Farming

The SPIN Farming technique involves growing high-value crops; using commercial refrigeration to cool crops after harvest and maintain premium pricing; relying on local water sources for irrigation; using standard bed sizes of 2 feet wide by 25 feet long; applying organic farming practices; and requiring minimal tools. The SPIN intermediate farming model, one that is expected to gross $54,000 per year, is reported to require the following start up and operation costs[115]:

Table 4: Estimated SPIN Start Up and Operating Costs

Start Up Costs	Amount	Operating Costs	Amount
Pick up Truck	$5,000	Rent for farm plots	$1,000
Walk-in Cooler (10'x10')	$3,500	Seeds	$1,000
Rototiller	$2,000	Gas	$1,000
Farm Shed	$1,000	Stall fees	$400
Irrigation	$1,000	Sales bags	$300
Farm Stand Set Up	$350	**Total**	**$3,700**
Bins	$200		
Post-harvest Area	$200		
Tools	$200		
Garden Seeder	$100		
Total	**$13,550**		

While this method may gross significant revenues, the drawbacks are that the net profit for farmers is low, the hours are long and the subsequent pay per hour is lower than minimum wage. One report stated that Satzwich and his wife together make a total of $30,000 a year, and work 10-12 hours a day, 6-7days a week from May to mid-December, resulting in a rate of $6.25/hour per person[116]. However, there may be other non-monetary benefits for urban farmers such as the satisfaction of earning a living from the land, the development of community ties through selling and meeting consumers at distribution locations, working much shorter hours in the 6 month winter season from December to May, and being part of a greater movement for self sufficiency in the City of Vancouver. Also, to encourage urban farming, municipalities could offer incentives to urban farmers to offset start up and operation costs (This suggestion is also presented as a recommendation in Section 4.5).

4.4.2 Technology To Save the Day?

Faced with future food shortages, many may look towards technological advances to maintain food supplies. While this seems like an easy solution to deflect a food crisis, it is inherently unsustainable to rely on systems that require massive inputs of fossil fuels.

Modern agriculture is already hugely dependent on technological developments and fossil fuels with artificial, oil-based pesticides and fertilizers, petroleum-based agrochemicals, diesel powered farm machinery and energy input needed to pump groundwater for irrigation. Refrigeration, distribution, and packaging of food also have substantial energy requirements.

Food produced in this way is unsustainable because it depletes a non-renewable source of energy and returns degraded wastes into the environment in the form of polluted water and soils. At present, "about 10 to 15 calories of fossil fuel energy are used to create 1 calorie of food and although it only uses about 17% of the U.S. annual energy budget it is the single largest consumer of petroleum products when compared to any other industry"[117]. Before fossil fuels were used for agriculture, humans used to live within the regenerative capacity of the biosphere by allowing soil nutrients to be replenished through crop rotation and using animal manure as fertilizer[118]. Sustainable agriculture practices therefore do not depend on finite resources to fuel machines, distribute water and produce fertilizer.

A hydroponic greenhouse system and a Vertical Farm concept are featured in this section as two technological solutions that are receiving attention in the media as possible means for future food production. Several problems exist with these ideas such as their needs for large amounts of energy to create and power the structures; exceptionally high costs to maintain and repair the systems; and a likely higher ratio of fossil fuel energy per calorie of food produced than conventional or current agricultural production techniques.

OrganiTech

Instead of growing plants in soil, hydroponic crops are raised in mineral infused water. Plants sit in a shallow container and are given mineral nutrients to obtain higher yields than soil grown plants. Compared to soil based systems, hydroponics uses 1/20th of the water, produces yields that are up to 6 times greater, requires no electrical or mechanical devices and uses only 1/3 of the space[119]. Plants can be placed closer together as they are not competing for oxygen and they reach maturity faster given that they are receiving their exact necessary nutrients.

OrganiTech is one company that applies a hydroponic greenhouse technique to grow 5-7 times more than a conventional greenhouse[120], though their system requires much electricity, heat, lighting and other input costs.

Cos- Romaine Lettuce.
Photo Courtesy of OrganiTech Website.

Source: http://www.organitech.com/index.php?page_id=255

Their GrowTECH 2500 is a "a fully automated, computerized controlled Hydroponics sustainable greenhouse designed to grow and harvest commercial quantities of hydroponics, pesticide free, green leaf vegetables while making optimal use of resources such as water, energy, labor and land"[121]. One GrowTech unit is 0.1 hectares in size (~0.25 acre) and can produce between 822 and 1370 heads of lettuce per day (or 300,000 to 500,000 heads of lettuce per year) depending on the climate, size and variety of crop. Cabbage, spinach, onions, celery and herbs can also be raised using this system.

OrganiTech Lettuce Production.
Photo Courtesy of OrganiTech Website.

The cost of the GrowTech unit is unavailable on their website but secondary costs are estimated. OrganiTech has calculated the electricity consumption to be between 10 and 20 KW/Unit. At 10 cent/KWh the cost will be about $8,700 - $17,400 per year per unit. For water, each unit needs 40-60 cubic meters per month and any quality is acceptable although the operation and systems costs are higher for various water qualities. Also required but not predicted are heat and lighting costs.

One main input not mentioned is the need for fertilizer. Hydroponic fertilizer and regular fertilizer for soil-based farming are similar in that they both require the same nutrients- nitrogen, phosphorus and potassium. The difference is that with hydroponic fertilizers, the exact type and amount of micro-nutrients for plant growth are provided whereas with regular fertilizers, plants receive some of their micro-nutrients from the soil. Though not listed on their sales site, the amount of fertilizer needed for the OrganiTech system is likely to be considerable and the cost of fertilizer is likely to be expensive (hydroponic fertilizer ranges anywhere from $15-$50 per litre).

This system claims to produce up to 500,000 heads of lettuce per year, however the extremely high energy, start up and maintenance costs (price of a GrowTech Unit; energy required for manufacturing and upkeep of greenhouse and hydroponic system; electricity; heat and lighting; water; fertilizer) are likely to be much greater than the caloric value of 500,000 heads of lettuce.

Vertical Farms

Recently featured on the World Business Council for Sustainable Development's website was the idea of large, high-tech vertical farming as a way to grow food in cities on small tracts of land. Dr. Despommier, a professor of microbiology and environmental sciences at Columbia University in New York City, leads the Mailman School of Public Health's Vertical Farm Project. This project, established in 2001, states that a 30 -story building on one city block could produce an annual revenue of $23,000,000 and enough food to feed 50,000 people on an annual basis using already existing technologies[122]. Despommier believes that 150 of these buildings could feed the entire population of New York for one year using green technologies such as rotating solar panels to follow the sun, small versions of windmills that use blades to turn air upward, and glass panels that collect and clean pollutants from rainwater as it slides down the building. Figure 4 and 5 show this "vertical farm [that] would be self-sustaining and even produce a net output of clean water and energy" [123].

There are sizeable challenges for implementing such a farm. Large investments of money (one real vertical farm was built in Arizona in the 1980s at a cost of $200 million)[124] for infrastructure are needed and another 5-10 years of intensive research would be required to determine "how to marry high-tech agricultural practices with the latest sustainable building technology"[125].

Also, since the Vertical Farm has not yet been developed, there is no accounting of the real energy inputs, laborers, materials, budgets, repair costs, etc. But the total costs for such a structure are significantly higher than conventional field farming. The advantages to the Vertical Farm may also be overstated- particularly the declaration that food produced in the system does not require fertilizers (there is no mention of a composting system and if it would produce enough nutrients and fertilizer for all the food growth. Hydroponic and soil based systems would both require fertilizer). Also, vertical farms purport to be able to produce high yields but production levels reached in laboratory settings are not necessarily achievable in real life full production locations.

Advantages to Vertical Farming (VF)
(As stated on the Vertical Farm Project Website)

- Year-round crop production; 1 indoor acre is equivalent to 4-6 outdoor acres or more, depending upon the crop (e.g., strawberries: 1 indoor acre = 30 outdoor acres)
- All VF food is grown organically: no herbicides, pesticides, or fertilizers
- VF virtually eliminates agricultural runoff by recycling black water
- VF converts black and gray water into potable water by collecting the water of evapotranspiration
- VF adds energy back to the grid via methane generation from composting non-edible parts of plants and animals
- VF dramatically reduces fossil fuel use (no tractors, plows, shipping.)

http://www.verticalfarm.com/

Figure 4: Inside a Vertical Farm

Photo: Architectural Design by Rolf Mohr; Modeling and Rendering by Machine Films; Interiors by James Nelms Digital Artist @ Storyboards Online.

Source: http://nymag.com/news/features/30020/index3.html

In Figure 4:

1. The Solar Panel
Most of the vertical farm's energy is supplied by the pellet power system. This solar panel rotates to follow the sun and would drive the interior cooling system, which is used most when the sun's heat is greatest.

2. The Wind Spire
An alternative (or a complement) to solar power, conceived by an engineering professor at Cleveland State University. Conventional windmills are too large for cities; the wind spire uses small blades to turn air upward, like a screw.

3. The Glass Panels
A clear coating of titanium oxide collects pollutants and prevents rain from beading; the rain slides down the glass, maximizing light and cleaning the pollutants. Troughs collect runoff for filtration.

4.The Control Room
The vertical-farm environment is regulated from here, allowing for year-round, 24-hour crop cultivation.

5. The Architecture
Inspired by the Capitol Records building in Hollywood. Circular design uses space most efficiently and allows maximum light into the center. Modular floors stack like poker chips for flexibility.

6. The Crops
The vertical farm could grow fruits, vegetables, grains, and even fish, poultry, and pigs. Enough, Despommier estimates, to feed 50,000 people annually.

Figure 5: Inside a Vertical Farm Continued

In Figure 5:

4. The Crop Picker
Monitors fruits and vegetables with an electronic eye. Current technology, called a Reflectometer, uses color detection to test ripeness.

5. The Field
Maximization of space is critical, so in this rendering there are two layers of crops (and some hanging tomatoes). If small crops are planted, there might be up to ten layers per floor.

6. The Pool
Runoff from irrigation is collected here and piped to a filtration system.

7. The Feeder
Like an ink-jet printer, this dual-purpose mechanism directs programmed amounts of water and light to individual crops.

Not depicted in Figure 4 or 5 but part of the Vertical Farm concept:

The Evapotranspiration Recovery System
Nestled inside the ceiling of each floor, its pipes collect moisture, which can be bottled and sold.

The Pipes
Work much like a cold bottle of Coke that "sweats" on a hot day: Super-cool fluid attracts plant water vapors, which are then collected as they drip off (similar systems are in use on a small scale). Despommier estimates that one vertical farm could capture 60 million gallons of water a year.

Black-Water Treatment System
Wastewater taken from the city's sewage system is treated through a series of filters, then sterilized, yielding gray water—which is not drinkable but can be used for irrigation.

The Pellet Power System
Another source of power for the vertical farm, it turns nonedible plant matter (like corn husks, for example) into fuel.

The Pellets
Plant waste is processed into powder, then condensed into clean-burning fuel pellets, which become steam power. At least 60 pellet mills in North America already produce more than 600,000 tons of fuel annually, and a 3,400-square-foot house in Idaho uses pellets to generate its own electricity.

4.4.3 Recommendations

1. Explore Food Production Best Practices
Food production best practices can be studied from urban agriculture leaders such as Singapore, Hong Kong and Calcutta, and applied to the City of Vancouver. However, best practices and crop selections from cities with similar climates to Vancouver may prove more useful. Research is needed to determine successful, temperate climate practices and crops.

2. Certify Local Foods
A certification for food grown locally can be created to encourage more local food consumption by urbanites and more support for urban farmers. A label, similar to ones for organic produce, can be placed on local goods that are sold at farmers markets or in grocery stores. Local food sold in restaurants could follow the model of the Vancouver Aquarium's Ocean Wise program that works with restaurants to label sustainable seafood options on their menus. A label for menu items that use local meat and produce could be developed.

3. Establish Small Scale Test and Education Sites
Similar to the City of Philadelphia, the SPIN method can be tested on a half acre of city land (0.2 hectares) to see how much produce can be grown in this region, what the profit margins are, if there is a viable market for this produce in Vancouver (residents may prefer to buy premium produce from distributors such as Capers, Urban Fare, etc. rather than at a farmer's market), and if residents are interested in undertaking farming as a profession. Hydroponic farming can also be tested. The production yields and net profits can be compared to that of the SPIN method. These test locations can serve as educational sites for potential urban farmers, interested public, planners and policymakers. A more difficult test is vertical farming, as it requires large infrastructure, investment and further research. However, recognizing municipal funding restraints, a smaller scale vertical farming test project may be possible through co-partnerships between the municipality and private sectors.

4. Re-Use, Conserve and Harvest Water
Water may be the limiting factor in future food production therefore strategies to re-use, conserve and harvest water are necessary. Municipalities can encourage efficient irrigation of crops through incentives, subsidies or tax breaks for farmers that are willing to "shift from the less efficient flood-or-furrow system to overhead sprinkler irrigation or to drip irrigation, the gold standard of irrigation water efficiency"[126]. Low pressure sprinklers would reduce water usage by 30% and drip irrigation would reduce water usage by 50%. Vancouver can also capitalize on the average annual rainfall of 1117.2 mm or 43.98 inches[127] by harvesting rainwater for summer food production.

4.5 CONSIDERATION 5: WHO IS GOING TO DO IT?

Recruiting a dedicated labour source may prove to be challenging because of the physical nature of the work, lower wages and long hours during the growing season. In developed world cities, only a small percentage of the population participates in significant urban food production and the total savings from growing food in urban gardens is minimal[128]. This section would ideally examine the demographics of food producers in Vancouver, but given the small number of farmers and lack of data, trends in the Greater Vancouver Regional District and Canada are used.

4.5.1 Life of the Farmer

Vancouver has 1500 community gardeners[129] and 75 farm operators. The specific number of farmers in each operation is not documented by Statistics Canada however farm operators were defined as "those persons responsible for the day-to-day management decisions made in the operation of a census farm or agricultural operation"[130]. There may be more food producers in the city, according to a document by the International Development Research Centre that stated, 42% of Vancouverites grew vegetables, fruit, berries, nuts or herbs in their yards or balconies[131]. However, the food currently grown in community gardens, yards and balconies is unlikely to represent a considerable portion of the grower's food intake.

Food production is therefore dependant on farm operators but statistics depict a pressing need for recruitment of workers in this profession. The 2001 Census of Agriculture showed, that in the GVRD, the majority of farmers were male (65%) and the average farm operator age was 52 years. Only 7.5% of these farmers were under 35 years of age[132] and this demographic has fallen drastically in British Columbia. From 1996 to 2001, farm operators in this category dropped by 36.5%, signifying an aging farm population with disturbingly few younger farmers to continue future food production.

Average incomes for Canadian farm families were comparable to that of the general population but only because more farmers were shown to be seeking off-farm employment or had off-farm businesses. Statistics Canada reported in 2000 that Canadian farm family income averaged $64,160, only 3.2% lower than the average family income of the general population. However, farmers were working hard to keep their incomes comparable with the rest of the Canadian population and almost half of all farmers, 48.4%, had off-farm jobs or businesses.

Food production in urban backyards also garnered low wages for farmers. Satzewich's hourly rate worked out to be $6.25 for a total combined income with his wife of $30,000/year using his SPIN farming method.

Urban Gardener.

School Project- Learning How to Garden
Photo Courtesy of Joshua Wickerham

4.5.2 Learning About the Land

Eight Vancouver schools- Grandview, Queen Alexander, Lord Roberts, Tennyson, Tyee, U-Hill and Vancouver Technical high school- incorporated food growing as a part of their curriculum[133]. As well, there were 13 agricultural education programs at farms around the GVRD for students, parents and teachers to learn about various practices such as beekeeping, planting, harvesting, and organic farming[134].

At the university level, the University of British Columbia Farm offered for- credit educational opportunities in a number of departments including Agricultural Sciences, Agroecology, Landscape Architecture, Global Resource Systems, Food, Nutrition, and Health, and Earth and Oceans Sciences. There is also the option to participate in directed studies and internships with the UBC Farm.

Other food growing information and education programs for the general public can be found through food security organizations in Vancouver. A list was compiled by the Vancouver Food System Assessment research team who noted the following 8 groups: the Urban Diggers Society, Strathcona Community Gardens, UBC Farm, FarmFolk/CityFolk, BCIT Green Rooftop Research, City Farmer, Fruit Tree Project, Vancouver Permaculture Network.

4.5.3 Recommendations

1. Raise the Profile of Urban Farming as a Profession

Establishing food production test sites in the city, using SPIN, hydroponic or greenhouse growing, could help to raise the profile of urban farming as a city profession. These test sites could determine income potential for urban farmers and prove that farming can be profitable in the city. Marketing of urban farming can also take place in art galleries. One example is Amy Franceschini's recent exhibit in the San Francisco Museum of Modern Art. The picture to the right shows one of her displays, a gardener's outfit and a wheelbarrow that can attach to a bicycle, in her exhibit on resuscitating San Francisco's victory gardens from World War II.

2. Encourage More Urban Farming in Private and Public School Curriculum

Since the current farming population is ageing, there is a need to educate and encourage young adults to pursue a career in urban farming. The Vancouver School Board and private, independent schools such as Waldorf and Montesorri, could liase with the 13 farms that provide agricultural education for 2 to 3-month intensive agricultural classes that could count for course credit or fill mandatory high school volunteer hours.

3. Offer Incentives for Urban Farmers

Financial incentives, credit loans, information on crops and farming techniques, can encourage urban farming and assist with start up costs. Incentives can also be distributed for those farmers that use natural fertilizers and bio-pesticides. One example of financial incentives comes from the Belgium policy of Bebloemingsacties, or planting action[135] that:

- Paid 31 euros ($45) per square meter for growing succulent mosses, grasses and herbs for a green roof. The program pays a maximum of 5,000 euros ($7,300); the minimum is 6 square meters.
- Paid 250 euros ($364) for collecting and reusing rainwater. The money goes to fund a collecting system and pump.
- Gave each household as many as 3 live chickens, which will consume kitchen waste and add fertilizers to the garden.

San Francisco Museum of Modern Art Exhibit. Photo Courtesy of Amy Franceschini.

4.6 CONSIDERATION 6: WHAT ABOUT TOOLS & MACHINERY?

Tools, water, seeds and soil amendments are provided in most of Vancouver's community gardens through plot and membership fees[136]. As more people engage in food production that is not necessarily in a community garden, more of these resources will be required for urban farmers. Community tool sheds or tool banks can be developed in each neighbourhood to provide tools, compost, mulch, seeds and gardening tips. The following three case studies offer examples on how communities can share tools and resources.

Gardening Tools

4.6.1 Detroit Garden Resource Program Collaborative

The Detroit Garden Resource Program is a collaborative effort by the Detroit Agriculture Network, The Greening of Detroit, Capuchin Soup Kitchen's Earth Works Garden, and Michigan State University Extension. This program supports community, school, and family gardens by providing seeds, plants and access to neighbourhood gardening groups. For example, family gardens can pay $10 a year and receive 13 packs of easy to sow seeds, 1 flat of vegetable transplants with 72 plants, and an invitation to participate in one of six cluster groups in the city that coordinate local resources, has tool sharing programs, educational opportunities, technical assistance and other garden needs such as tilling, soil testing, compost, wood chips, mulch, and weed fabric. For community and school gardens, a fee of $20 a year acquires 37 packs of seeds, 3 flats of vegetable transplants with 72 plants, and have access to a cluster group. In 2005, this program assisted 650 households, including 80 community gardens and 79 family gardens[137].

4.6.2 Atlanta Community Toolbank

Atlanta, Georgia's Community Toolbank is one of the largest tool lending programs for community groups in the United States. In 2005, the program equipped 53,000 volunteers and 160 non-profit organizations with tools for 830 community projects[138]. Originally started in 1992 as a resource for community members who volunteered to repair homes of low income, inner city seniors, this initiative has attracted much interest in recent years with demand for the program growing by 20% each year since 2002.

The toolbank has 140 different types of tools valued at over $500,000. An annual membership fee between $10 and $100 is collected depending on the group's annual budget, and a handling fee of 6% of the tool's retail value is collected for administration and program costs. Table 5 below shows

select tools, their retail value and the handling fee.

Table 5: Examples of Tools and Handling Fees

Tool	Retail Value	Handling Fee
Digging bar: 6 ft (heavy)	$20.97	$1.26
Dirt tamper	$18.94	$1.14
Shovel: round (long handle)	$6.24	$0.37
Spade: drain / trenching	$16.93	$1.02
Spade: round (short handle)	$12.98	$0.78
Bow saw	$4.93	$0.30
Bulb planter	$2.94	$0.18
Hand trowel	$2.97	$0.18
Hoe: garden	$5.94	$0.36
Wheelbarrow: 6 cubic ft	$49.97	$3.00

4.6.3 Oakland Tool Lending Library

Located in San Francisco's East Bay area, the Oakland public library offers a tool lending service[139]. This unique program grew out of a Home Resources Collection that was established after the disastrous Oakland Hills Firestorm in 1991 to help residents rebuild and repair their houses and other property.

There are 2,700 tools for loan including garden and digging apparatus. The tool library operates similarly to any public library, with set lending periods (3 days for most equipment), late fees (depending on the value of the tool), and rental limits for new patrons (3 tools-1 power tool only- per checkout for the first 6 weeks. After a 6 week probationary period, patron is allowed 8 tools- no more than 3 power tools- for each checkout).

Example of Tools and Late Fees

$2 Aerator
$2 Axes
$1 Bow saw
$1 Bulb planter
$2 Digging/tamping bar
$1 Fruit picker
$1-$2 Hedge shears *(manual)*
$10 Hedge trimmer *(electric)*
$1-$2 Hoes *(garden, mortar, eye, hula)*
$1-$5 Lawn edger *(electric, manual)*
$5 Lawn mowers
$2 Posthole digger
$2 Pruning shears
$1 Rake *(leaf, bow, grading)*
$20 Rototiller
$2-$5 Shovels *(round, square pt.)*
$2 Spading fork
$5 String trimmer *("Weedeater")*
$5 Two-person tree saw

4.6.4 Recommendations

1. Develop Community Tool Libraries

Tool lending libraries would reduce the start up and annual upkeep costs of tools and machinery for urban farmers. As well, if farmers are not growing food near their houses, they could borrow tools in neighbourhoods that are closer to their gardening plots, thereby reducing the need to transport heavy, bulky equipment. To organize a tool library, a meeting would need to be held to determine farmer's equipment needs; available tools (belonging to farmers or donated by other residents); location of storage (at a home or in a common area); how to cover the costs of tool purchases and ongoing maintenance; develop lending, repair, and tool-return rules; develop a system to track checkout and returns; and assign administrative responsibility[140].

2. Determine Locations for Tool Libraries

Implementation of tool libraries would be most beneficial in areas such as Strathcona/Downtown East Side, Grandview-Woodlands, Downtown and Renfrew-Collingwood where there are greater numbers of low income and food insecure residents that cannot afford the start up costs of tools and resources but need to engage in food production to supplement their income and food intake. Other areas that could use tool libraries are those neighbourhoods identified to have the greatest number of undeveloped or underused land with urban agriculture potential. An inventory of such lands was conducted in 2007 and a total of 639 sites were identified with the largest number of potential sites located in Renfrew-Collingwood (55 sites), followed by Hastings Sunrise (53), Kensington Cedar Cottage (49) and Downtown (41)[141].

5.0 CONCLUSION & SUMMARY OF RECOMMENDATIONS

Planners, policymakers, government officials and city residents are embracing the need for more community gardens, other urban agriculture projects, and food security planning in their cities.

Vancouver is one Canadian municipality that has, within the last 4 years, initiated several food projects and plans. This included the formation of the Vancouver Food Policy Council, a Vancouver Food Charter, a Food Security team at Vancouver Coastal Health, an Olympic legacy to create 2010 community garden plots by 2010, the appointment of a Food Policy Coordinator at the City of Vancouver, and two food action plans. All these movements are exciting and have helped to create a broader awareness and general acceptance for food security in the city.

However, before implementing any new food security and urban agriculture projects in Vancouver, a reflection on our basic intents and future goals is necessary to guide our next steps.

This paper argues that rapid urbanization, climate change, global warming and peak oil will have considerable effects on city dwellers' future food supplies. Therefore, maximum food production must be the primary objective in cities, particularly in existing and new community and rooftop gardens, on undeveloped lands and in agricultural land reserve areas.

This paper creates a framework for a food production plan and offers 19 recommendations for food security groups in the City of Vancouver. Further research, public consultations and collaboration between food security groups will be necessary for serious food production to begin in the City of Vancouver.

Summary of Recommendations:

Who Needs this Planning?

1. Reserve 50% of Plots in New Community and Rooftop Gardens for Food- Insecure Persons
2. Create a Priority Waiting List in Current Community Gardens

What is the Food Production Target?

3. Determine Food Productions in the City
4. Determine Food Consumptions in the City
5. Calculate Vancouver's Food Self-Reliance & a Reasonable Food Production Target

Where Will We Grow This Food?

6. Map Vancouver's Food Shed
7. Establish Farms that Produce Perishable Goods Nearer to Urban Centers
8. Cease Removal of Land from the ALR
9. Examine Locations & Feasibility of Peri-Urban Farming
10. Explore Mari-Culture Options

How Will We Grow It?

11. Explore Food Production Best Practices
12. Certify Local Food
13. Establish Small Scale Test and Education Sites
14. Re-Use, Conserve and Harvest Water

Who Is Going to Do It?

15. Raise the Profile of Urban Farming as a Profession
16. Encourage More Urban Farming in Private and Public School Curriculum
17. Offer Incentives for Urban Farmers

What About Tools & Machinery?

18. Develop Community Tool Libraries
19. Determine Locations for Tool Libraries

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