GROWING GREEN: for SUSTAINABLE FOOD SYSTEMS

A Law Reform Project

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Growing Green: Introductory Essay

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1.0 INTRODUCTION

Since food and its production are essential for life, *Growing Green*'s objective is to enhance the capacity of the voluntary sector so that it can better promote law, policy and regulatory reform that will lead Canada towards sustainable agriculture and food systems.

- What and how food is produced has profound impacts on our environment. There is little argument that agriculture affects the health of our soil and water.[1] The evidence of a direct connection between industrial agriculture and climate change is growing.[2]
- Our food system affects consumers in today's society. Today's North American diet is very different than it was only a few years ago.[3] Diet-related chronic diseases are now as much of a health concern as hunger.[4]
- Our food system affects rural farm communities. Farmers receive a smaller percentage of the consumer's food dollar today than 20 years ago and for most commodities, the costs of farming outrun returns.[5] Also, farmers are aging, and farm children seldom follow in their parents' footsteps. There is a question as to who will produce our food in the future.

In light of these issues, there are many opinions about the value of food: for some, food is simply a necessary inconvenience, while others will go to the ends of the earth for a fine meal. There is also a fierce debate about how our food should be produced, processed, distributed, marketed and consumed. For example, it is hard to disagree with Canada's Agricultural Policy Framework and its aim "to make Canada the world leader in food safety, innovation and environmental protection." But what this means in practice has yet to be carefully defined:

- One food future might rely on technology to manufacture safe, clean, tasty, nutritious food in laboratories and factories.
- A very different food future might rely on soil-based agriculture and emphasize local sources of supply to provide first for the basic nutritional needs of the population, trading only the excess.

The actual result will likely be something between, and/or a combination of, these two visions - one by lab and one by local. To find a path that meets the diverse needs of Canadian society, while preserving the environment, it will be necessary to engage a broad range of interest groups and to develop win-win solutions.

2.0 ENVIRONMENTAL BENEFITS AND SYSTEMIC CHALLENGES IN THE FOOD SYSTEM

The food system produces far more benefits than just the calories we eat:

- *Economic Benefits:* The agriculture and food economy multiplies jobs in communities and supports rural cultures.
- *Environmental Benefits:* Carefully managed, farmland protects the soil, provides a buffer against droughts and floods,[6] and can provide habitat for a range of species.[7]
- *Social Benefits:* Food is integral to building relationships between people and communities. We gather to buy and to enjoy food. Farmland – the working landscape – is important for people's sense of place and season.

There is a challenge, however. In many situations, rather than rewards, farmers incur penalties for providing these services, since "sustainable practices" increase costs, and cost increases make farms uncompetitive. The globally competitive industrial food system causes significant economic, environmental and social problems:

- As a result of plummeting farm incomes and rising costs, rural communities throughout North America are in decline. [8]
- Runoff from farmers' fields[9] means that agriculture is the world's chief source of water pollution.[10] Not only does this affect fish habitat, but it also has significant human health implications.[11, 12] In addition, pressure to produce low-cost crops has led to serious groundwater depletion in many grain-producing areas. This reduces the food system's ability to absorb future droughts.
- The distance food travels from field to mouth has increased dramatically[13] (some estimates suggest that some food items travel up to 4000 km[14] before being consumed). This makes the modern food system dependent on cheap, polluting fossil fuel energy for transportation. [15]

These problems are not necessary.[16] Farmers around the world and throughout agricultural history show that it is technically possible[17] to work within nature's limits, and overcome problems without environmental degradation.[18]

3.0 THE BENEFITS AND CHALLENGES IN CONTEXT: SOUTHWESTERN BRITISH COLUMBIA

Southwestern British Columbia is a rich agricultural area with good access to a major urban region. It has a long growing season, rich soil, and a well-developed transportation infrastructure. It should be a model region for sustainable agriculture and food. However, the socio-economic system as a whole has created a food production and distribution system that discourages environmentally sound farm management:[19]

- Farmers, consumers and the government often do not bear the costs of pollution and other types of environmental problems.[20] These costs are "external" to the price assigned to food by the market. As such, these costs are borne by the environment in general and are not part of traditional accounting or economics.[21] The consideration of water pollution as an externality has favoured capital-intensive livestock producers who achieve economies of scale by increasing herd size. In the Fraser River Valley this has resulted in serious nitrate pollution in an aquifer used as a municipal drinking supply.[22]
- Many of the environmental benefits of farmland are "public goods" because they are enjoyed by society at large, but actually are a liability to individual farmers.[23] For example, farmland in Southwestern BC is valuable habitat for migrating birds, which stop in fields on their annual trips between the Arctic and Mexico.[24] These waterfowl can cause an enormous amount of damage to farmers' fields.[25]
- Many farmers in Southwestern BC either have low incomes or farm rented land. These farmers cannot afford the long-term perspective required to engage in environmental conservation.[26] In economic terms this is called having a high "discount rate."[27] For example, farmers who rent land[28] plant crops that maximize short-term cash return even at the expense of longer-term soil conservation. This is a problem in Southwestern BC,[29] where a considerable amount of land is either owned by absentee landlords or is Crown land owned by the government.[30]

4.0 FINDING SOLUTIONS

Groups that span the political and ideological spectrum are concerned about these problems. Many solutions are proposed:

- Some feel that key strategies involve reducing regulatory barriers that farmers face when they try to enact best management practices.
- Others argue that the current food system is insecure because it relies on low-cost fossil fuel to transport food around the world. To protect ourselves against nightmare scenarios (including natural disasters, terrorist attacks, or rocketing oil prices) we need to develop an alternative or "back-up" plan that reduces our dependence on international energy supplies.[31]

- Others feel that a solution is to overhaul the food system, and focus on building a more "locally based" food economy.[32]

Growing Green has taken a collaborative approach, bringing parties together to develop strategies for moving forward on all three fronts. The project team is committed to working with farmers, and with people from food, health, environment and other sectors, to dismantle regulatory barriers and promote sustainable agriculture and food systems.[33]

One major goal of *Growing Green*,[34] which is funded in large part by the Voluntary Sector Initiative (Government of Canada), is to strengthen the capacity of voluntary organizations to contribute to federal, provincial and local law and policymaking. *Growing Green* is engaging in dialogue with as many voluntary sector farm, food and related organizations as possible. It has set aside budget resources to help facilitate policy dialogues. *Growing Green* will articulate, further develop, and share the collaborative planning models it is using. It will also produce resources to assist voluntary sector groups to continue and expand their participation in policy development in the future.[35]

The other major project goal is to develop concrete, practical law and policy reform proposals to make BC food systems more sustainable. Based on input received, the project's work has been divided into two key areas:

- *Making sustainable food systems work*. The price consumers pay for food does not represent its true social, economic and environmental costs – or benefits.[36] Ideas for improving food systems abound, in agriculture, health, environment, community development, labour and other sectors. Though food is the common thread, there are no forums for intersectoral food discussion and problem solving. Nor is food on government planning agendas. *Growing Green* will make the case for such forums (food councils)[37]; showcase model Official Community Plans and Bylaws; contribute to provincial public health legislation (drafters of BC's new *Public Health Act* are interested in connections between food security and public health) and attract small-scale food processors (who can increase community economic activity and provide new markets for BC farmers).

- *Making sustainable food systems pay.* The food system would provide more ecological services if there were a better economic case for doing so. *Growing Green* is investigating the following ideas as ways to make more sustainable food practices pay: promoting sustainable farming by reducing unnecessary regulatory barriers; bringing UK National Trust and other "working farm" trust models to BC; restoring farmers' right to conservation covenants on ALR land; obtaining affordable access to supply management schemes for family and integrated farms; and rewarding farmers for providing ecological services.

5.0 BACKGROUND EVIDENCE

[1] The United Nations reports that 38 per cent of agricultural land worldwide has been damaged "...to some degree by agricultural practices since World War II" (Gliessman, 1998). Because soil movement is a natural process, the US Soil Conservation Society considers 11 tonnes per hectare an acceptable rate of erosion. In the US, however, there is an average loss of 18 tonnes/ha of topsoil each year (Soule & Piper, 1992). As a result of poor agricultural practices, the Soil Conservation Society estimates that 20 per cent of all US cropland is heavily eroded and that 90 years of agriculture in Washington State has resulted in a 50 per cent reduction of the natural productivity of the soil (Soule & Piper, 1992). Gliessman points out that due to bad agricultural management, agriculture is the world's largest source of water pollution (Gliessman, 1998). Surveying these sorts of statistics, Pierce argues that agriculture threatens its own land base "...through various forms of land degradation, contamination of ground waters, decline of rural amenity values and the proliferation of undesirable chemicals..." (Pierce, 1993).

[2] Although the media often links climate change with increased droughts, some scientific evidence suggests that Canadian grain farmers will benefit from a longer growing season and increased CO_2 in the atmosphere (called CO_2 enriching). However, the science is unclear. Since the prairies are semi-arid, agriculture in this region is especially sensitive to drought. Also, pest outbreaks may overwhelm the benefits of the longer growing season. Since it is impossible to link specific weather events with climate change, federal policy should be oriented to create incentives to use "best management practices" as well as provide them with protection in case of droughts and pest-outbreaks. See: <http://infoserver.ciesin.org/docs/004-038/004-038a.html>; <http://www.ipcc.ch/pub/wg2TARtechsum.pdf>

[3] According to Larry Bomford of the British Columbia Association of Professional Agrologists, agriculture has been an important part of society for centuries in Europe. As a result, it holds a prominent position in European law and policy and in the minds of law and policy makers. Without this history, BC residents do not have the same sensitivity to how food is grown and what farms do for local economies, environments, and cultures.

[4] "*For the first time in human history, the number of overweight people rivals the number of underweight people, according to a new report from the Worldwatch Institute, a Washington, DC-based research organization. While the world's underfed population has declined slightly since 1980 to 1.1 billion, the number of overweight people has surged to 1.1 billion. Both the overweight and the underweight suffer from malnutrition, a deficiency or an excess in a person's intake of nutrients and other dietary elements needed for healthy living. "The hungry and the overweight share high levels of sickness and disability, shortened life expectancies, and lower levels of productivity-each of which is a drag on a country's development," said Gary Gardner, co-author with Brian Halweil of Underfed and Overfed: The Global Epidemic of Malnutrition. The public health impact is enormous: more than half of the world's disease burden-measured in "years of healthy life lost"-is attributable to hunger, overeating, and widespread vitamin and mineral deficiencies." <http://www.worldwatch.org/alerts/000304.html>*

[5] *Commodity prices in the past decade rose by about one-third of farmers' increased costs of production, putting them in an "unprecedented cost-price squeeze," said Allan Lines, Ohio State University agricultural economist.* *<http://www.agriculture.purdue.edu/aganswers/2001/5-18%20Squeeze_Play.html>*

[6] Fields of crops are often able to trap large amounts of water, which can protect people's homes from floods. Although farmers may lose valuable crops during floods, homes downstream may be saved from serious (life-threatening) damage.

[7] More than 300 species of birds, 46 species of mammals, and 16 species of reptiles are found in SW BC at some point in the year (Canada, 1992). Farm fields provide an ideal stopping ground for migratory birds that find newly sprouted winter wheat crops excellent forage on their way south. This brings these birds into

conflict with farmers as they do a huge amount of damage to fields in a very short period. This environmentally sensitive area must be managed very carefully to promote both farming and wildlife.

[8] In Canada, both the number of farms and farm income are in decline. Between the 1930s and the 1980s, the number of farms dropped from approximately 800,000 to 100,000 (Government of Canada, 1992 p. 9-5). A government publication entitled The Farm Income Crisis in Canada (Government of Canada, 1998b p. 1) shows that net farm income dropped by 53.4% in 1997. Roberts of the Globe and Mail writes "today's farm woes are precipitated by a sharp cyclical downturn in commodity prices, rising input costs, and … overproduction." (Roberts, 2001, on-line). South of the border, the New York Times reported that in October of 2000 the US government approved the biggest bailout in the history of the apple industry to help compensate farmers for an estimated $760 million loss in the previous three years (New York Times, 2000, on-line). Many of these concerns are raised in SW BC. Farmers complain about a lack of income, a report on agriculture in the region indicated that productivity was in decline, and a government document shows that British Columbia's fruit and vegetable processing industry has all but vanished (Municipality of Delta, 1992 p. 95).

[9] Today, elevated concentrations of nutrients and pesticides are frequently detected in Canadian surface waters draining cropland. "[T]here is not enough data to evaluate risks to humans and aquatic biota from agricultural sources…" (Chambers, *et al.* 2002).

[10] In an April 2001 study, 10 North American scientists concluded that the impacts of environmental change and degradation generated by world agriculture are in many respects more tangible and worrying than global warming. Vast tracts of forest and grasslands have been cleared for crops, agricultural runoff is fouling drinking water, fertilizers and manure are creating marine "wastelands", pesticides are showing up in mothers' milk, and common fertilizer ingredients (nitrogen and phosphorus) are altering the chemistry of air and water. If trends continue, the authors predict "massive, irreversible environmental impacts" by 2050 when nine billion people are expected to live on the planet. Pesticide use is expected to increase threefold, and twice as much fertilizer will be polluting the finite supply of the planet's water (Munro, 2001 and Tilman *et al.* 2001).

[11] Ontario's Provincial Auditor concluded in November 2001 that Ontario's food isn't safe: slaughterhouses are rusty and dirty, meat inspectors don't have proper equipment, most goat's milk contains illegal levels of bacteria, and fruits and vegetables have up to 80 times too much pesticide (Office of the Provincial Auditor, 2001, See also Smith, 2001). Health Canada says we receive 80% to 95% of our total daily intake of dangerous chemicals such as persistent organic pollutants through our food—and children are especially vulnerable. (See Environmental Defence Canada: Foodwatch, *supra* note 78: "Children are especially vulnerable to toxic chemicals through food because they eat more of it proportionally to their body weight, and their developing systems are more susceptible to the toxic effects of contaminants.") A national panel of scientists is calling for much tighter restrictions on the use of antibiotics in farm animals to combat the rise of antibiotic resistance in the country. (Canadian Committee on Antibiotic Resistance, *News Release*, 'Important Threat to Public Health Addressed at Meeting of Canadian Committee on Antibiotic Resistance,' (Ottawa: CCAR, October 7, 2002). See CCAR website for supporting material <http://www.ccar-ccra.org/agrifoodlinks-e.htm>. See also 'Restrict antibiotic in farming panel urges,' Globe and Mail, Tuesday, October 8, 2002, p. A21, and Health Canada, *Advisory Committee on Animal Uses of Antimicrobials and Impact on Resistance and Human Health*, (Ottawa: Health Canada, June 2002). The panel predicts that the health care cost of antibiotic resistance will rise from $700 million to $1.8 billion if antibiotic resistance increases to US levels. A study published in the Journal of Epidemiology and Community Health reports that 20 per cent of the food we eat is contaminated with toxic chemicals such as DDT, dieldrin and dioxin—pesticides that have been banned for decades. The data suggests five chemicals are routinely found salmon, cheese, and cucumbers. (K S Schafer and S E Kegley, 'Persistent toxic chemicals in the US food supply,' Journal of Epidemiology and Community Health <http://jech.bmjjournals.com/>. See also Picard, A., 'Pesticides banned many years ago

still in some foods', Globe and Mail, Tuesday, October 15, 2002, p. A10.) Another study conducted by the Canadian Food Inspection Agency shows abnormally high levels of furans, dioxins, and PCBs in food such as beef, pork, and eggs. (SeGuin, R., 'Carcinogens in some foods exceed accepted limits, study finds,' Globe and Mail, Monday September 16, 2002, p. A5). The study showed beef from Canada was far more contaminated than beef tested in Europe, but that Canadian poultry had the lowest levels of toxic agents (two to three times lower than poultry tested in Europe).

[12] Growing concerns about the effects of agricultural practices on environmental and human health have forced the Outdoor Recreation Council of BC to add Fraser Valley farm belt waterways and aquifers to the annual list of BC's most endangered rivers. (See Simpson, Scott, "Farm wastes put Fraser Valley waterways on endangered list: List of at-risk rivers influenced by Walkerton contaminated tragedy," Vancouver Sun, Monday, March 18, 2002, p. A1.)

[13] "*Everyone, everywhere depends increasingly on long-distance food. Encouraged by food processing innovations, cheap oil, and subsidies, since 1961 the value of global trade in food has tripled and the tonnage of food shipped between nations has grown fourfold, while population has only doubled. In the United States, food typically travels between 1,500 and 2,500 miles from farm to plate, as much as 25 percent farther than in 1980. For some, the long-distance food system offers unparalleled choice. But it often runs roughshod over local cuisines, varieties, and agriculture, while consuming staggering amounts of fuel, generating greenhouse gases, eroding the pleasures of face-to-face interactions around food, and compromising food security. Fortunately, the long-distance food habit is beginning to weaken under the influence of a young, but surging, local foods movement. From peanut butter makers in Zimbabwe to pork producers in Germany and rooftop gardeners in Vancouver, entrepreneurial farmers, start-up food businesses, restaurants, supermarkets, and concerned consumers are propelling a revolution that can help restore rural areas, enrich poor nations, and return fresh, delicious and wholesome food to cities." (Halweil, 2002)*

[14] See: Lang (2002), Hendrickson (1996) and Halweil (2002) for more information.

[15] Last year, to settle suits filed by the Attorney General and environmental groups, several of California's largest grocery chains agreed to warn residents about the cancer-causing risks of diesel exhaust exposure, to reduce idling time, and to conduct alternative fuel demonstration projects. "Attorney General Lockyer, Environmental Groups Announce Ground-breaking Proposition 65 Settlement with Major Grocery Chains Over Diesel Pollution." California Attorney General Press Release 00-077 (April 27, 2000). The settlement was reached with three grocery chains (Albertson's/Luckys, Ralph's and Von/Safeway), the Natural Resources Defence Council, Coalition for Clean Air, and the Environmental Law Foundation. Proposition 65, otherwise known as the *California Safe Drinking Water and Toxic Enforcement Act* of 1986, is designed to protect the public from exposure to toxic substances known to cause cancer or be harmful to reproductive health. The law requires businesses to provide "clear and reasonable notice" warning before exposing anyone to a chemical on a list. This warning is required unless the business can show that the exposure poses no significant risk. The A-G's news release states "[w]hile it is impossible to prove that any individual developed cancer as a result of being exposed to diesel exhaust from any of the distribution centers, state investigators determined that community residents near the grocery distribution centres were being exposed to levels that pose a risk and require a public warning under Proposition 65." *See also* "California, Grocers Settle Diesel Dispute," (Transport Topics—Trucking's Electronic Newspaper, May 8, 2000)]. Environmental groups were also awarded $895,000 in costs and the settlement is reported to create the largest private fleet of alternate-fuel big-rig engines in the US [*see* McKay, Paul, "Big Trucks, Big pollution," *supra* note 12]. Six months later, another California chain (Slater Brothers), reached a similar settlement [*see* "Another California Supermarket Settles Diesel Lawsuit" (Procert.com Trucking Industry News, November 11, 2000)].

[16] The Canadian Census supports the position that farmers are not negligent or ignorant. Based on responses in 1991 and 1996, the number of farms in the Lower Fraser Valley using practices to reduce soil erosion (called conservation tillage) rose from 312 in 1991 to 533 in 1996. The number of farms using winter cover

crops to prevent soil erosion and nutrient runoff during the wet winter months also increased from 903 to 977 (though this was a slight decline in the proportion of farmers using cover crops). Finally, the number of farmers using some form of crop rotation also rose (Statistics Canada, 1991, 1996). BC farmers have been at the forefront of North American producers since the 1980s in using environmentally sound pest management practices. Almost all greenhouse and tree fruit growers, and a majority of vegetable growers have minimized chemical pest control by using a variety of chemical and non-chemical techniques referred to as "integrated pest management" (Select Standing Committee on Agriculture and Fisheries, 2000, electronic source).

[17] For example, farmers can control pest outbreaks without the use of potentially environmentally damaging chemicals (Altieri, 1999b; Thrupp, 1997). Traditional farmers in Latin America use animal grazing to turn non-useful weeds into animal proteins, and plant different crops in one field to stop the spread of diseases that damage harvests (Altieri, 1999b). Although some authors are highly critical of industrial agriculture (Groh & McFadden, 1997; Kneen, McDougall, & C., 1999), the techniques of modern farming helped overcome the problem of soil erosion in 1999 when the worst drought since the Great Depression hit the Eastern United States. Highly mechanized American farmers used specialized equipment and zero till techniques (where crops are planted without ploughing the soil) to reduce the impact of the drought and the problems of erosion that seriously damaged the environment and hurt rural communities earlier this century (Borger, 1999).

[18] *In B.C., agricultural producers and processors have demonstrated a commitment to upholding environmental standards in their farm and production practices….farmers are, in fact, the original primary stewards of the land and water….[and] environmentalism is inherent to good farm practices, since farmers, more than any other group, have an unmediated understanding of their dependence on clean water, soil and air. (Select Standing Committee on Agriculture and Fisheries, 2000, electronic source.)*

[19] Currently, food production is driven by market economics that are based on supply and demand. In an ideal situation, entrepreneurs produce goods and services and compete for customers. Consumers buy these goods and services and generally choose the product with the lowest price. The price that consumers pay is a reflection of the cost of producing the item plus a profit margin for the entrepreneur. Competition between firms to attract customers ensures that the lowest price is available at all times, and the profit margin provides an incentive for firms to stay efficient. This system of economic organization has been so successful at distributing resources that it now dominates global society. Despite these successes, there is a rich and often controversial debate on how the market deals with such non-economic factors as the environment or social welfare (Clark, 1991; Jacobs, 1993; Panayotou, 1993). This literature helps us understand why environmental problems persist on farms.

[20] *We feel that if corrective measures are to be imposed on agricultural lands, be it environmental regulations or labour standards, those costs must be passed on to the consumer or society in general …[for example] an outright grant to ensure that a "works for society's benefit" becomes society's cost, not a … land owner's cost. (L. Hunter, farmer, Kamloops-Okanagan Dairymen's Association, Hansard, October, 27th, 1999.)*

[21] The market does not assign a price to things that do not have a monetary value. As a result, the price of food reflects the immediate cost of production (such as the value of the land, the labour, and any equipment, processing and transport) but does not necessarily include any other costs incurred. In general, therefore, unregulated markets ignore social and environmental costs (Strange, 1988). If, for example, a livestock farm pollutes a stream because of poor manure management, and the farmer is not obliged to clean up the pollution, this environmental cost will not appear in the price that the consumer pays. In this way, the pollution of the stream is an "externality" (Jacobs, 1993; Panayotou, 1993). An externality occurs when the price for a product does not include all the impacts of that good or service. While externalities can be negative or positive, in the environmental literature externalities refers more often to negative impacts. There

are a number of ways that negative externalities are internalised. A firm may make a voluntary decision to take account of (negative) externalities. This may lower profits, pricing a firm out of the market unless the firm can obtain a premium price for producing an "environmentally friendly" product. Alternatively, a government can pass legislation that taxes externalities or applies charges to firms that produce negative externalities. Governments may also establish regulations to internalise environmental costs.

[22] Abbotsford is now home to 18,000 dairy cattle and 600,000 chickens. Adjacent census regions are no different. East Chilliwack had roughly 21,000 cattle and 800,000 chickens, and West Chilliwack supports 8,500 cattle and 630,000 chickens. As a result, more manure is produced on less land in the East of the Lower Fraser Valley. This manure interacts with local soil conditions and creates a number of water pollution problems. Many dairy farms, such as those in Chilliwack, are on relatively deep silt loam soils. In this situation, seasonally shallow water tables and flooding may result in surface runoff and drain nutrients and pathogens (such as E. coli) into surface water such as streams and ditches. Alternatively, some of the livestock farms in the Lower Fraser Valley sit on the Abbotsford Aquifer, the largest and most extensively-used unconfined groundwater aquifer in the valley (Environment Canada, 2000, electronic source). The Abbotsford Aquifer also straddles the U.S.-Canada border and provides water to over 100,000 people in the Abbotsford region and in north central Whatcom County of Washington State, USA. Because this water flows southward from Canada to the USA, some communities in Washington State worry that nitrate levels on the Canadian side are polluting American drinking water (Environment Canada, 2000, electronic source). Environment Canada has observed nitrate contamination in this aquifer since the 1950s, though they only began intensively studying the problem in 1992. Since 1992, nitrate levels have regularly exceeded the 10 mg/L Guideline for Canadian Drinking Water Quality and, of 1,526 groundwater samples collected from monitoring wells between 1992 and 2000, 70 per cent exceeded this guideline (Environment Canada, 2000, electronic source). According to an Environment Canada website, individual tests returned values ranging from a low of 0.025 mg/L to a high of 91.9 mg/L, with average values ranging well above Canada's suggested safe levels (ecoinfo.org/env_ind/region/nitrate/nitrate.htm). Work done by Zebarth *et al.*, suggest that intensive agriculture has contributed to groundwater pollution since nitrogen surpluses in this region are due to intensive livestock production. According to Zebarth *et al.*, in 1971 there was 134 excess kg of N per cropped hectare over the Abbotsford Aquifer. By 1981, this had risen to 185 kg/ha, and by 1991 it was 245 kg/ha (Zebarth *et al.*, 1998 p. 99-112).

[23] The market can efficiently assign values to some resources, but not all of the goods provided by this planet fit into this framework. Jacobs (1993), points out that resources such as clean air and water are "public goods" because they provide benefits for all people, yet none can personally profit from them (Jacobs, 1993). In other words, if a firm was to produce a "public good" for one consumer they would have no way of excluding all other potential consumers from using it at no cost. Similarly, consumers of public goods cannot limit their consumption and will always use roughly the same amount no matter what the circumstances. Panayotou argues that public goods are goods "that have only externalities" (Panayotou, 1993). As a result, no one individual can obtain profit from these, they are free for the consumer, and valueless from the perspective of the market. In a capitalist setting, public goods are inevitably under-produced and under-valued despite the fact that they may be integral to our survival. This is relevant to our discussion because farmland produces both public goods and private goods. The private goods it produces are the commodities that the farmer can sell on the market. According to Ostrom, these goods are "subtractable" and "excludable" (Ostrom et al., 1994, p. 7). Commodities are subtractable because once the food is consumed it is gone. Excludability refers to the fact that once a consumer purchases the commodity all other consumers are excluded from using it. Farmland, however, also provides public goods that are neither subtractable nor excludable. Wildlife habitat, the conservation of biological diversity, and rural amenity, are all services that farmland provides, yet farmers cannot profit from any of these services because they are not subtractable or excludable. Consequently, farmland is managed to produce maximum private goods, but

public goods are often ignored. Accordingly we argue that this is an area where the public sector should exercise its jurisdiction, to protect the public goods and reward those who steward them.

[24] The entire west coast of North America is on the migration path for the millions of birds that spend their winters in California and Mexico and their summers in the Arctic or Siberia. The Lower Fraser Valley is a vital environmental resource as it is one of the last undeveloped river deltas, and one of the largest areas where wetlands and tidal flats are still reasonably undisturbed on the West coast. The inter-tidal flats and marshes of the Lower Fraser Basin support an average of half a million waterfowl, gulls, and shore birds. In addition, researchers have observed up to 1.4 million individual birds in this area during migration. Between October and April, the Lower Fraser Basin is home to tens of thousands of snow geese that feed on the shores and marshes and through the winter months. No other area in Canada is host to this density of bird life (Canada, 1992). However, less than 1 per cent of the Fraser Basin is reserved for the use of wildlife (Canada, 1992). Many wetlands have been drained for agriculture. For example, the Sumas Lake, upstream from the mouth of the Fraser River, was drained in the 1920s, and between 1967 and 1982 wetlands declined by 26 per cent (Canada, 1992). With these changes to habitat, at least five bird and one mammal species have vanished since European settlement and the yellow-billed cuckoo, purple martin, western bluebird, horned lark, and burrowing owl no longer nest in the region (Canada, 1992). The barn owl, sandhill crane, and yellow-headed black bird now only nest in small numbers and the numbers of greater white-fronted goose, brant and some races of Canada goose have also declined.

[25] Recently, a novel solution has emerged to address this problem. In 1993, a coalition of farmers and conservationists formed the Delta Farmland and Wildlife Trust (DFWT) to "…provide a forum for implementing creative solutions that ensure habitat is provided for wildlife without causing excessive burdens on farmers within the Fraser delta" (Delta Farmland and Wildlife Trust, 2001 promotional brochure). The coalition created a program that pays farmers to establish grasslands to provide habitat for raptors and ground-dwelling mammals. This gives farmers an "…opportunity to improve soil structure and organic matter, while simultaneously providing habitat for wildlife" (Delta Farmland and Wildlife Trust, 2000 fact sheet). Funded by a number of public and private sources, the DFWT pays farmers to establish a mix of native grasses and clover for one to five years. Farmers are paid $60.70 /ha per year ($150 per acre) if they chose to cut the grass for hay or $121.41/ha per year ($300 per acre) if they leave the grass in the field. These grasslands have proven to be excellent habitat for a variety of species; in particular, shrews, deer mice, and voles that are valuable prey for raptors. Waterfowl also use the set-asides during their migration through the area. Hence, the DFWT has created a financial incentives to use farmland to provide wildlife habitat and provides an incentive for farmers to manage their land for both public and private goods.

[26] "*As a farmer, the best way to control a piece of property is to own it. Then you have the long-term commitment to it, and you can manage the property in the way that you see fit. A lot of times, investments you make on land are long-term investments." (L. Hunter, Farmer, Transcripts from The Province of British Columbia's Standing Committee on Agriculture, October 27th, 1999).*

[27] The conservation of any natural resource, be it soil organic matter, forests or water, involves sacrificing present consumption for the promise of future benefits. Panayotou points out that since people usually prefer immediate over future benefits "…such an exchange appears unattractive unless one dollar of sacrifice today yields more than one dollar of benefits tomorrow." (Panayotou, 1993, p. 50) In other words, there is an opportunity cost associated with conserving the environment (Clark, 1991). Future benefits must be discounted and the more heavily they are discounted the less attractive conserving a resource is. The behaviour of some farmers in the Lower Fraser Valley reveals a pre-occupation with the present, indicating that they may face high discount rates. Farmers at the mouth of the Fraser River have focused on intensive soil-based agriculture, and produce horticultural crops like potatoes and cole crops. Unless this is accompanied by the regular use of grass forage as part of the rotation, and the use of local manure for

fertilizer, this draws down the natural fertility of the soil, hurts drainage, increases salinity, and causes compaction. All of these problems were identified by a major survey of this area (Klohn Leonoff Ltd., 1992, p. 32). In this situation, farmers have put short-term profitability ahead of long-term soil conservation. Similarly, tenant farmers, who will not have the long-term planning horizon required to establish sustainable management practices, farm some of the land in this area. Short-term planning or a high discount rate, therefore, is an indication of environmental difficulties.

[28] Secure land tenure is widely assumed to be important for good agricultural land management (Panayotou, 1993). Farmers who engage in long-term soil conservation may sacrifice immediate income for the promise of better soil fertility and enhanced production in the future. Since there are no guarantees that farmers who rent land will reap the benefits of long-term soil conservation, tenant farmers are expected to use management strategies that maximize short-term production even if this compromises future soil fertility. For example, Gills *et al.* (Gillis, Perkins, Roemer, & Snodgrass, 1992 p. 494) argue that different land tenure agreements can have a major impact on farm productivity as "…an individual proprietor who owns land knows that increased effort or skill that leads to a rise in output will also improve income…" Nowak and Korsching *(Nowak & Korsching, 1983)* and Schertz and Wunderlich *(Schertz & Waunderlich, 1981)* both present data that shows farmers who own land use a broader number of management strategies and adopt best management practices earlier than farmers who rent. Ervin (Ervin, 1982 p. 285-88) echoes this, illustrating that erosion rates for owner-operated cropland are lower than rented cropland (however, it is unclear whether this decline is due to land tenure or intervening site-specific variables). Bomke and Temple *(Bomke & Temple, 1990)* use thirty years of data to show that organic matter in five rented fields declined. Although data do not allow comparisons with non-rented fields, the authors conclude that long-term improvements such as drainage tiles, laser leveling and forage rotation crops are not feasible under the short-term leases offered to many farmers and that this results in declining organic matter on rented fields.

[29] Farmland in British Columbia is administered through two systems that mark this region as unique. First, in the late 1960s, the government expropriated a large amount of prime farmland at the mouth of the Fraser River to make way for industrial development. Construction on this development never began, but the land – called the Roberts Bank back-up lands – was never returned to farmers and has been farmed on short-term leases ever since. Second, in an effort to preserve local farmland in the early 1970s, the province of British Columbia established the Agricultural Land Reserve (ALR), a region composed of all high quality farmland in the province. Owners are prohibited from building or developing ALR land without a permit, which are usually impossible to obtain for anything other than agriculture. As a result, tenant farmers work a large amount of farmland at the mouth of the Fraser River where development rights are restricted as most of the land is in the ALR.

[30] The effect of short tenure on soil conservation became the basis of public policy in southwestern British Columbia, where the government owns 23% of agricultural land (Klohn Leonoff Ltd., 1992). In 1993, the provincial government, concerned about the potential impact of insecure land tenure, promised to offer longer-term leases to farmers (Bellett, 1995, p. B2). Specifically, in 1995, the government promised to remove a clause that allowed leases to be cancelled within 90 days, and to offer ten- and twenty-year leases instead of the much more common one-year leases. This was, according to one commentator, because "…none of the farmers will invest any money into the property they are renting. They won't ditch it properly, make it level for drainage. They won't practice good stewardship and given these leases there is no reason why they should." (Bellett, 1995, p. B2)

[31] "*Complex terrorism operates like jujitsu—it redirects the energies of our intricate societies against us. Once the basic logic of complex terrorism is understood (and the events of September 11 prove that terrorists are beginning to understand it), we can quickly identify dozens of relatively simple ways to bring modern, high-tech societies to their knees. ….[To identify areas where we are vulnerable we must examine] the critical complex networks upon which modern societies depend. They include networks for*

producing and distributing energy, information, water, and food; the highways, railways, and airports that make up our transportation grid; and our healthcare system. Of these, the vulnerability of the food system is particularly alarming. However, terrorism experts have paid the most attention to the energy and information networks, mainly because they so clearly underpin the vitality of modern economies.(Homer-Dixon, 2002)

[32] "While a certain amount of food trade is useful, communities that seek to meet their food needs locally as much as possible will realize other benefits as well:

- Rebuilding local foodsheds requires rebuilding the local diversity of crops and food businesses needed to adequately feed the local population. Farmers producing for the local market tend to increase the diversity of their plantings – a shift with advantages for the diets of local people and the ecology of local landscapes.
- Money spent on local produce at farmers' markets, at locally owned shops, or on locally produced foods stays in the community longer, creating jobs, raising incomes, and supporting farmers. Developing nations that emphasize greater food self-reliance can thereby retain precious foreign exchange and avoid the whims of international markets.
- Local food often costs less than the equivalent food bought on the international market or from a supermarket, because transportation costs are lower and there are fewer middlemen."

See: Halweil, 2002.

[33] One of the earliest uses of the term sustainability was in a 1972 article from The Ecologist entitled "The Blue Print for Survival." The term later gained popularity with the publication of the U.N.'s Brundtland Report in 1986 (McIsaac, 1994). According to the Brundtland report, sustainable development depends on ensuring that the needs of future generations are not compromised by our behaviour today. Edwards et. al. believe, however, that since future needs cannot be perfectly anticipated, sustainable agriculture must be a system that can evolve indefinitely "...towards greater human utility, greater efficiency of resource use and a balance with the environment that is favourable to humans and most other species" (Edwards, Lal, Madden, Miller, & House, 1990). This has been further interpreted to mean that sustainability must be ecologically sound, economically viable, and socially responsible (Ikerd, 1997, p. 14). There is no single definition of sustainable agriculture. At its most fundamental, sustainability means change. Implicit in any discussion on sustainability is the realization that there are some problems with the way we currently do something and some vision about how to correct these failures. It is important to remember, however, that no system will be entirely "sustainable." Consequently, sustainability also means constant change, as circumstances and technologies shift over time. The goal of sustainable agriculture, therefore, is a process where we continually change our management in order to reduce our negative impact on the environment.

[34] To acknowledge and build upon innovative ideas generated across the country, Growing Green will work with and seek advice from a project Reference Group of community leaders, and exemplary national organizations like the Toronto Food Policy Council and the Organic Agriculture Centre of Canada.

[35] To make responsible use of its resources, Growing Green has had to make several difficult decisions about what it will investigate and what it will not. Fisheries, aquaculture, genetically-engineered food, and "uncultivated food" harvested primarily by First Nations are beyond the scope of the project.

[36] Pierce writes that sustainable agriculture must maintain or enhance environmental quality, provide adequate social and economic returns for all firms involved, and provide a sufficient and accessible source of food for consumers (Pierce, 1993). Olson points out that although ecological knowledge is necessary for environmental sustainability, farms succeed and fail in the "real" world of competitive markets and global commodity trading (Olson, 1992 p. 9-10). As a result, any improvements in a farm's ecological sustainability cannot be made at the expense of economic viability or social relevance.

If we can't educate the consumer to see that there's a difference between a tomato produced here and one from Mexico or a chicken piece from here and one from Georgia, we're not going to make it. This is a race to the bottom, and we're going to lose (B. Warner, British Columbia Ministry of Agriculture and Food, Hansard, June 15th, 1999.) I think that for many years, if we look at British Columbia, there have been three or four large retail chains that have controlled the grocery dollar…. But I think, in a province and a country where we value freedom of choice, the consumer is the one that's going to make the decision ultimately. On the one hand, people say that they don't like big-box stores, huge grocery stores or the loss leaders on milk, etc., because it hurts local economies. At the same time, people vote with their feet when they go and buy in those stores. (J. van Dongen, Committee Member and MLA for Abbotsford, Hansard, October 13th, 1999.)

[37] Community-based food councils are effective mechanisms for supporting local food economies that in turn increase economic development, environmental benefits, community relationships and population health. The Toronto Food Policy Council has been in existence for 10 years, translating food issues into economic/environmental/social "wins" for the City. Every recommendation it has made to Council has been unanimously accepted. In several communities in BC, food security coalitions or food policy councils have grown up in the past 5 years. All of them bring diverse sectors together to discuss the community's food system. All of them have had consistent support and leadership from local Community Nutritionists. None of them yet has a formal advisory role to municipal government. Growing Green's task, using the model of the Toronto Food Policy Council as a guide, is to work in Vancouver and Victoria to enhance the status and effectiveness of the existing coalitions in the Greater Vancouver Regional District and the Capital Regional District by facilitating their transition into food councils with links to local and regional governments. At the same time, through input to the new *Public Health Act*, it may be possible to develop a provincial food security initiative and food council, which could assist and support the work of regional/local food councils.

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