

**Food Production and Supply in Canada  
■ Issue Exploration Report –**

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## **Executive Summary**

### **1. Introduction**

Food, like air and water, is essential for life. In this sense, it is the most strategic of goods. This paper outlines Canada's successes in producing and supplying food and then explores those factors that may pose a risk to our food and agriculture system if not properly addressed. None of these problems are insurmountable but current solutions could benefit from improved conceptual framing of the problems and solutions, application of coherent policy frameworks, and better program design. Some recommendations for consideration by the NRTEE are provided to address these deficiencies.

### **2. Overview of the Canadian food production and supply situation**

Canada has a strong market dominated agricultural sector that, for decades, has more than adequately provided enough food to meet the aggregate needs of the population. Generally, Canada's strength lies in bulk commodity production (e.g. wheat, canola, beef). One area where consumption requirements are not met is fruits and vegetables, as domestic production now only meets 19% of fruit consumption and 67% of vegetable consumption (not including potatoes). Production deficits are compensated by imports, although Canada also imports significant volumes of goods that it also exports, for example beef and related products and many fruits.

The food and agriculture system is a top 5 industry in Canada, with about \$50 billion in annual economic activity (half of it exported), accounting for about 8% of GDP and 1 job in 7 (third largest employer). Canadian governments typically budget from \$2-4 billion annually to support the sector.

By international standards, Canada has a relatively sophisticated system to ensure food safety, although it is currently challenged by the global complexity of food distribution and the emergence of new food safety hazards. However, progress on resolving natural resource degradation is slow; there is little commitment to ensure the economically marginalized have access to a nourishing diet; and nutritional health remains a secondary consideration.

### **3. An overview of the current Canadian regulatory and fiscal frameworks governing food**

The food and agriculture system is a divided jurisdiction. Generally, the federal government has a lead policy role on matters related to cross-border commerce, farm financial safety nets, agricultural research and technology development, food and phytosanitary safety, food standards, packaging and labelling, and nutritional health. The provinces (and sometimes territories) also have supporting roles in these areas, and take the lead on matters related to commerce and food safety within their boundary, land use and agricultural land protection, property taxation, many

areas of environmental protection, and agricultural extension. The two jurisdictions often collaborate on program design, with the federal government offering guidelines or rules to establish national coherence and equivalency, but the provinces often take a lead role in program delivery. The traditional funding formula in agriculture is 60% federal / 40% provincial and territorial. Urban municipal involvement is generally restricted to food safety measures and nutritional health promotion, but rural municipalities can affect agriculture through zoning, planning and property tax decisions.

In addition to these jurisdictional divisions, the other significant dilemma of governance in the food and agriculture system is the absence of parliamentary involvement. Most recent significant federal government decisions in agriculture have not been debated in public.

## **4. Some key problems**

Of particular interest to the NRTEE are significant problems related to environment, economy and health that have been identified and that are not being fully addressed by governments. These are presented in the table below.

Two kinds of ratings are used in assessing these problems. (See box) Both are based on the author's interpretation of the indicator literature and opinion of informed stakeholders.

### **EXPLANATION OF RATINGS**

#### **Seriousness of Problem**

*High:* Major disruption of social, economic and environmental systems already underway

*Moderately high:* Major disruption of systems imminent if dramatic action not immediately taken

*Under stress:* Systems demonstrating signs of significant stress

*Emerging:* Problems emerging that could have significant implications

*Subsiding:* Significant investments have been made and situation is improving

*Minor:* Minor problems that can be fixed without significant investments

#### **Potential for Improvement with Suitable Investments**

1. No possibilities for improvement in the near to medium term
2. Some possibilities for improvements in the near to medium term
3. Modest improvements possible in the near to medium term
4. Strong possibilities for improvement in the near to medium term
5. The problem can be solved permanently in a reasonable timespan.

### **4.1 Environment**

Although Canada has a reputation for environmental quality, the agriculture sector has harmed natural resources. There have been some improvements since the late 1970s, when degradation of soil and water resources associated with agriculture became a national policy issue, but Canada still lags behind other countries in the OECD on many agri-environmental measures.

*Food Production and Supply in Canada: Issue Exploration (July 2004)*

<b>Issue (ref. in Main Report)</b>	<b>Causes</b>	<b>Seriousness</b>	<b>Government view</b>	<b>Key barriers to improvements</b>	<b>Potential for improvement</b>
Soil degradation (4.1.1)	Bare soil, short crop rotations, excess tillage	Under stress	Significant investments made in solutions	Excessive focus on tillage, not enough on crop rotations	4 (over medium term)
Water pollution and scarcity (4.1.2)	Excess nutrients (animals & fertilizer) & pesticides; water inefficiency	Moderately high	Previously a lack of action, but recent increases in regulatory and enforcement activity	Jurisdictional and approach squabbles between federal departments and with provinces, farm sector	2 (low until better collaboration established )
Greenhouse gas emissions and climate change impacts (4.1.3)	Farming and food travel are a main GHG producer; few net benefits nationally	Moderately high	Modelling and research on technologies and practices; no overall plan for reductions	Few supports to help farmers adopt new systems to reduce GHG and increase adaptive capacity	4 (over medium term)
Loss of agricultural land (4.1.4)	Urbanization and low farm income	Under stress	Left largely to provinces, with mixed results	Disparity between value of land for farming and housing	3
Biodiversity - loss of species and habitats (4.1.5)	Destruction of habitat, agricultural pollution	Moderately high	Some conservation plans, but actions limited	Lack of landscape level design and planning	3
Genetic resources and genetic engineering (4.1.6)	Narrowing of traits of interest and suitable environmental conditions	Under stress	Deep commitments to genetic engineering; limited commitment to genetic conservation	Economic forces promoting genetic engineering and narrowing traits of interest	2 (current approaches deeply entrenched despite significant criticisms)

## **4.2 Economy**

Canada is firmly committed to the current global food trading system. Although Canada thinks of itself as an exporting nation, it is also a major importer. There is evidence that this commitment is not optimizing sustainability, rural vitality and health.

<b>Issue</b>	<b>Causes</b>	<b>Seriousness</b>	<b>Government view</b>	<b>Key barriers to improvements</b>	<b>Potential for improvement</b>
Low farm incomes (4.2.1)	Low prices and high operating costs	High	Expand markets, improve efficiency, offer safety nets	Lack of significant action on structure of market failures	2
Negative effects of globalization (4.2.2)	Corp. concentration, dismantled national economies	High	Globalization is actively supported and largely positive	Failure to acknowledge negative impacts and their severity	1 (in the short and medium term)
Lost economic opportunities (4.2.3)	Export focus not improving farm income or consumer welfare	Under stress	Limited interest in localizing the food economy	Economic theory, political authority of a few agribusiness firms	2 (in the short and medium term)

## **4.3 Nutrition, food safety and health**

The nourishment and health of Canadians is not the paramount objective of the nation's food system, except as it relates to provision of safe food. Many opportunities are being missed to create a healthier society.

<b>Issue</b>	<b>Causes</b>	<b>Seriousness</b>	<b>Government view</b>	<b>Key barriers to improvements</b>	<b>Potential for improvement</b>
Food insecurity - not all have access to a nourishing diet (4.3.1)	Lack of income, higher than need be food costs, poor retail access, nutrient poor foods	Under stress (high for specific groups)	Action plan exists, but little implementation	Reliance on charitable sector, failure to acknowledge food system role	4
Food safety systems may not ensure safe food (4.3.2)	Globalization, high-throughput facilities, reliance on biocides	Under stress	Major commitment exists, but is it keeping pace with food system changes?	Current risk assessment, lack of clear policy directives, budget pressures	3

*Food Production and Supply in Canada: Issue Exploration (July 2004)*

Declining nutritional value (4.3.3)	Early harvest, long-distance transport, processor demands	Emerging	Receives little attention	Reluctance to research evidence of nutrient decline and causes	1 (in the short term)
Food de-skilling (4.3.4)	Corporate control, limited consumer information, processed foods	Moderately high (health status implications)	Commitment to fraud prevention, but not too full consumer information	Protecting food markets more important than nutritional health	4

## **5. Farming systems that solve multiple policy problems: Organic farming**

Organic farming is the most recognizable farming system based on agroecological principles. The organic food market is growing at 15-25% annually in Canada, the only significant growth area in the food sector. Although evidence is not yet definitive, organic farming appears to solve multiple policy problems, including: reduced soil degradation and water pollution, lower greenhouse gas emissions, greater biodiversity conservation, reduced financial pressures on farmers and less need for government financial supports, revitalized rural communities, greater consumer confidence, and possibly improved nutritional value of food. Policy makers have yet to recognize these benefits.

## **6. Recommendations for possible NRTEE work**

In general, it can be said that agriculture suffers for a lack of sustainability advocates. Given the NRTEE's experience in the field of sustainability and multistakeholder consultation, there are opportunities to add significant value to work already underway and to create new areas of inquiry and action.

### **SHORT TO MEDIUM TERM**

#### ***6.1 Reform of the Agricultural Policy Framework (APF)***

Canada's new Agricultural Policy Framework is in part a response to some of the problems highlighted above. It attempts to integrate five previously separated areas of agricultural policy - farm financial safety nets, environment, food safety, innovation (including genetic engineering) and rural renewal. AAFC hopes to brand Canadian food as the most environmentally responsible in global trade.

**Recommendation:** The key need here is to help AAFC design and implement environmental programs that will meet the targets set out. Some farm organizations and ENGOs have taken on this challenge but need more partners and resources if they are to have an impact. To its credit, AAFC is somewhat cognizant of the criticisms levelled against its environmental program.

**Recommendation:** Rural renewal appears to be an under-resourced area within AAFC and a sustainability framework appears not be central to their program design. Innovative ideas on rural renewal programming could have an impact on negotiations for APF2 in 2008.

**Recommendation:** Using a sustainability framework, research is needed on possible financial instruments that can help reduce multiple financial, environmental and food safety risks, while addressing farm concerns about a properly resourced financial safety net.

**Recommendation:** AAFC and the farm sector are somewhat at loggerheads over how a branding initiative might be developed. A third party may have an interesting opportunity to determine the future of this initiative by providing well reasoned and detailed options on how branding could be structured.

## ***6.2 Rebuilding regional food markets***

**Recommendation:** At this point, regional food flows have been poorly researched in Canada. The economic and environmental implications of failing to optimize regional food markets have not been well explored. Consequently, strategies for rebuilding such markets are poorly articulated. NGOs do not have the resources to properly research food flows and government departments of agriculture are unlikely to take on this task given commitments to globalization.

## ***6.3 Supporting expansion of organic farming and food distribution***

The organic sector has developed a National Organic Strategic Plan, outlining 33 strategic actions to advance development of the sector. These actions address issues of policy, programming, research and extension, market development and institutional capacity building. The organic sector, however, is significantly under-resourced and lacking the intellectual and financial capacity to implement many of the measures.

**Recommendation:** The NRTEE could examine the National Organic Strategic Plan to identify strategic actions to which it might contribute.

## **MEDIUM TERM**

## ***6.4 Changing problematic central features of the food regulatory system***

Key to environmental and food safety assessments at the federal regulatory level is the use of a particular construction of scientific assessment of risk, and a risk-based allocation of resources. This approach has generated intense debates about its effectiveness.

**Recommendation:** A well elaborated proposal on how to incorporate the precautionary principle into food and agriculture regulation could significantly mobilize advocates for change, and soften regulatory opposition. Some preliminary work has been done by NGOs, including World Wildlife Fund and the Canadian Environmental Law Association on pesticide regulation, Pollution Probe on a variety of subjects including food safety, and the Canadian Institute for Environmental Law and Policy and Greenpeace on genetic engineering in the food and agriculture system. Similarly, other jurisdictions have implemented elements of societal benefit assessment but Canadian regulators continue to claim such assessments are insufficiently developed to be useful. A review of assessment methods used in other jurisdictions, with advice on how to apply them in the Canadian context, would be a very useful contribution to this discussion.

### ***6.5 Exploring payments for environmental services to both stabilize farm incomes and generate environmental improvements***

It is well established in North American literature that the off-farm benefits of mitigating pollution far exceed the on-farm costs of implementing improvements. The implication is that those benefiting from the mitigation, i.e., society at large, should pay at least some of the on-farm costs of conservation. Some Canadian farm organizations and at least one province (PEI) are now examining payments for environmental stewardship to improve environmental performance and farm finances, inspired by supports currently provided to farmers in the EU. With this approach, farmers receive payments for providing environmental and rural amenity services when they adopt new measures and systems that protect the environment, including organic farming and Integrated Pest Management (IPM).

**Recommendation:** The Organic Agriculture Centre of Canada at Nova Scotia Agricultural College has submitted a funding proposal to the federal government to discuss the merits of this alternate financing mechanisms amongst stakeholders and to do some modelling work on different scenarios associated with its adoption. This application may not be successful, and regardless, more organizations are need to provide intellectual and financial resources to this discussion.

### ***6.6 Creating a national food policy***

Canada does not currently have a national food policy. Efforts to create one in the 1970s failed. The federal and provincial governments have extensive agricultural policy, some nutrition policy and programming, and social and economic policy that has a significant impact on food security. However, these policy domains are largely disconnected. A coordinated food policy would integrate goals related to sustainable agriculture (including organic farming), health promotion, employment, rural renewal, poverty alleviation, and food skills development.

**Recommendation:** The time is opportune for a new initiative to generate a national food policy. Given the experience of the 1970s, it cannot likely be successfully led by AAFC. A body like the NRTEE might be well placed to lead a multi-stakeholder consultation.

## ***6.7 Facilitating development of food citizens***

Because food is so central to life, it is argued that everyone has a stake in the way the food and agriculture system is organized. People should not so much be food consumers as food citizens.

**Recommendation:** The concept of food citizenship is poorly explored in Canada. Dr. Tim Lang in the UK is one of the pioneers of this concept and some jurisdictions in other parts of the world have implemented some interesting measures. A full exploration of the merits of food citizenship and its implementation in Canada (including public education and consumer information rules) would significantly advance discussion of this concept and measures to bring it to life.

## ***6.8 Beyond supermarkets: diversifying mechanisms for acquiring a nourishing diet***

Across the country, NGOs concerned about food security are engaged in projects that attempt to take food distribution out of the supermarkets and into community and public spaces. Many have been quite successful at increasing access to an affordable and nourishing diet for small numbers of people. The challenge is to expand these initiatives, but significant roadblocks are in the way, including the lack of recognition by policy makers of their significance, difficulties creating NGO - private sector - institutional partnerships to support them, long-term financing, and in some cases institutional policy and structural design barriers (e.g., schools constructed without proper kitchen facilitators, building lobbies that can not accommodate a market space).

**Recommendation:** The NGO sector is in need of a strategic plan to advance its programming efforts. There is an emerging national network of these organizations, facilitated in part by Ryerson University's Centre for Studies in Food Security. Lacking a coordinated plan in this area, member organizations struggle to be effective and to have a significant impact on policy, institutional and private sector actors.

## **LONG TERM**

### ***6.9 Redesign of pricing, trade and governance***

#### **6.9.1 Proper food pricing - internalizing external costs**

In industrial countries, food prices do not reflect their real costs, with the environment and human health absorbing unpaid costs externalized by food producers, processors and retailers. In that sense, cheap food is an illusory concept.

**Recommendation:** Significant Canadian work is required on consumer level impacts of cost internalization in the food and agriculture system. There are a number of studies articulating the billions of dollars in externalized costs of conventional food production and distribution. Only a few have attempted to relate these costs to consumer food prices.

#### 6.9.2 Transforming trade - building self-reliance

Canada has drifted away from earlier positions of relative self-reliance. To date, only five significant studies have addressed the potential for food self-reliance in Canada. All have concluded that Canada would need to make substantial changes to agricultural land use to ensure a sustainable agriculture scenario, highlighting in particular imbalances in animal vs. crop production and the need for significant investments in the fruit and vegetable sectors.

**Recommendation:** Building on these earlier studies, a full assessment of Canada's potential for food self-reliance, and the environmental and economic implications of different paths, is required.

#### 6.9.3 Broadening governance of the food and agriculture system

Governance in the food system is fragmented, and guided by a narrow range of intellectual and economic forces. There is usually no mechanism to bring large issues to public debate about agricultural development. Discussions often take place at the level of regulation and program implementation, but without a comprehensive framework to guide their development.

**Recommendation:** There is a pressing need to present new models for governance of the food and agriculture system at a national level. Municipal food policy councils are a viable local mechanism for new governance and some preliminary work on reorganizing the federal AAFC has been carried out by the Toronto Food Policy Council.

## **1. Introduction**

Food, like air and water, is essential for life. In this sense, it is the most strategic of goods. The vast majority of Canadians rely exclusively on the market place to ensure their access to food. Anthropologists have stated for years that how a society manages food both reveals and reflects the sophistication of its social and economic development<sup>1</sup>. While air and water retain their status as public goods (though not always well treated), food is a market commodity. That it is treated as a commodity creates both benefits and problems.

The Canadian and global food and agriculture systems are highly complex, involving numerous actors and activities, from input manufacturing to farming to food brokering and wholesaling, food and food by-product processing, retailing, food service operations, consumer food preparation and food waste management. It is an important economic sector. Food system work also includes such largely invisible tasks as commodity futures brokerage, food styling (for the advertising industry), dead stock disposal, hospital menu planners, and air transit planning and coordination (for long distance, just in time delivery of perishable foods).

Canada has a solid reputation for food production, distribution and international trade. The agricultural economy appears to be stable and economically robust, our citizens are generally well-nourished, and we have historically enjoyed a reputation as international leaders in certain parts of the agri-environmental field. In reality, our food and agriculture system is not as stable as generally acknowledged, with significant inter-related environmental and economic problems that governments could address more effectively.

This paper outlines Canada's successes in producing and supplying food and then explores those risks that will undermine our food and agriculture system if not properly addressed. None of these problems are insurmountable but current solutions could benefit from improved conceptual framing of the problems and solutions, application of coherent policy frameworks, and better program design. Some recommendations for consideration by the NRTEE are provided to help address these deficiencies.

## **2. Overview of the Canadian food production and supply situation**

Canada has a strong market dominated agricultural sector that, for decades, has more than adequately provided enough food to meet the aggregate needs of the population. On a per capita basis, Canada produces excesses of cereals, pulses (lentils, chick peas, edible beans), vegetable oils, beef, pork and fish, largely meets consumption of dairy, chickens, eggs and turkeys (the supply managed commodities), but does not meet consumption requirements in fruits and vegetables. Canada is particularly weak in these production areas, as domestic production currently meets only 19% of fruit consumption and 67% of vegetable consumption (not including potatoes)<sup>2</sup>. These levels have dropped dramatically from 50 years ago when Canada was largely self-sufficient in basic fruits and vegetables<sup>3</sup>. Production deficits are compensated by imports (though Canada also imports products it exports, see below for more). Since nutrition

reports conclude that Canadians significantly under-consume fruits and vegetables for optimal health<sup>4</sup>, production deficits in these sectors would actually be higher if the population was meeting the Healthy Eating Guidelines of Health Canada. Generally, Canada's strength lies in bulk commodity production (e.g. wheat, canola, beef), although there have been significant investments over the past 20 years in increasing food processing activity. Certain sectors, for example wheat processing, remain weak in this regard.

These successes have resulted from the collective efforts of farmers, food businesses, the agricultural research and extension establishment, and major financial, policy and program investments by government. The food and agriculture system is a top 5 industry in Canada, with about \$50 billion in annual economic activity (half of it exported), accounting for about 8% of GDP and 1 job in 7 (third largest employer)<sup>5</sup>. Canadian governments typically budget from \$2-4 billion annually to support the sector.

By international standards, Canada has a relatively sophisticated system to ensure food safety, although it is currently challenged by the global complexity of food distribution and the emergence of new food safety hazards (such as BSE). However, progress on resolving natural resource degradation is slow; the food production and distribution system is challenged by globalization; and food security and nutritional health remain secondary considerations in the overall design of the food and agriculture system.

### **3. An overview of the current Canadian regulatory and fiscal frameworks**

The food and agriculture system is a divided jurisdiction. Generally, the federal government has a lead policy role on matters related to cross-border commerce, farm financial safety nets, agricultural research and technology development, food and phytosanitary safety, food standards, packaging and labelling, and nutritional health. The provinces (and sometimes territories) also have supporting roles in these areas, and take the lead on matters related to commerce and food safety within their boundary, land use and agricultural land protection, property taxation, many areas of environmental protection, and agricultural extension. The two jurisdictions often collaborate on program design, with the federal government offering guidelines or rules to establish national coherence and equivalency, but the provinces often taking a lead role in program delivery<sup>6</sup>. The traditional funding formula in agriculture is 60% federal / 40% provincial and territorial.

Municipal involvement depends largely on the location of the municipality, and its province. Urban municipalities generally have little direct role in food production and supply but because many have responsibilities for public health, do engage in food inspection activities and nutritional health promotion. Urban municipalities also affect food distribution through zoning policies that may determine food store and food company locations and their associated economic activity. Rural municipalities can have more direct impacts on agriculture through zoning, and property and education tax decisions. Municipalities often have a lead responsibility

for household and commercial waste management. Since a large part of the waste stream is food and food packaging, their policies and programs (or lack thereof) may indirectly impact food system behaviour.

A quick look at Canada's food safety system conveys a sense of the governance complexity. The food safety system is guided by over a dozen main pieces of legislation<sup>7</sup>, 3 layers of government carrying out different or overlapping functions in a more or less coordinated fashion<sup>8</sup>, and more than one agency involved within each layer (although certain ones tend to be central, e.g., the Canadian Food Inspection Agency (CFIA) federally). Numerous functions are carried out (training and education, pre-market consultations, product approvals and licencing, labelling and advertising, monitoring, inspection, post-market monitoring, recalls, enforcement, policy making, import controls, etc)<sup>9</sup>, with multiple targets within the food chain (e.g., farms, processing plants, warehouses, retail, restaurants, imports and their foreign facilities), and a full range of food and packaging products<sup>10</sup>. More detailed examples of roles are provided in Appendix 1.

In addition to these jurisdictional divisions, the other significant dilemma of governance in the food and agriculture system is the limited role of parliament. Most recent significant federal government decisions in agriculture have not been debated in public. The tendency in recent years is to use existing legislation as a foundation for an initiative, to develop the initiative within the appropriate line department or agency (usually AAFC or CFIA), the PCO and the PMO, and to use Orders-in-Council and the Estimates to create the necessary authorities for action<sup>11</sup>. Two recent and high profile examples are the Agricultural Policy Framework (APF), a fundamental and largely positive shift in agricultural policy, and GMO regulation. Although there are often consultations leading up to implementation, these are rarely designed to facilitate a national consensus on necessary changes. Rather, the pattern is to generate numerous ideas, from which government officials can choose their preferred options. This has produced frustration amongst stakeholders..

## **4. Some key problems**

In this paper, the analysis of problems and solutions is guided by the frameworks described in Appendix 2.

The traditional government and industry view of food in Canada has centred on four premises: 1) that the food and agriculture system provides nourishing food and that all food system actors are interested primarily in nourishing the population; 2) that food is cheap for consumers; 3) that hunger is a problem largely of insufficient income, and that the structure of the food system is not itself part of the problem; and 4) that the food system is capable of addressing any problems of environmental degradation without any significant redesign of its structure or activities.

Others, however, see structural problems in the performance of Canada's food and agriculture system. Of particular interest to the NRTEE, significant problems related to environment,

economy and health have been identified and are not being fully addressed by governments. These are discussed below.

Two kinds of ratings are used in assessing these problems. (See box below.) Both are based on the author's interpretation of the indicator literature and opinion of informed stakeholders.

#### **EXPLANATION OF RATINGS**

##### **Seriousness of Problem**

*High:* Major disruption of social, economic and environmental systems already underway

*Moderately high:* Major disruption of systems imminent if dramatic action not immediately taken

*Under stress:* Systems demonstrating signs of significant stress

*Emerging:* Problems emerging that could have significant implications

*Subsiding:* Significant investments have been made and situation is improving

*Minor:* Minor problems that can be fixed without significant investments

##### **Potential for Improvement with Suitable Investments**

1. No possibilities for improvement in the near to medium term
2. Some possibilities for improvements in the near to medium term
3. Modest improvements possible in the near to medium term
4. Strong possibilities for improvement in the near to medium term
5. The problem can be solved permanently in a reasonable timespan.

## **4.1 Environment**

Although Canada has a reputation for environmental quality, resources and environmentally sensitive habitats have been destroyed in the name of food production . A recent report from the World Wildlife Fund (WWF) Canada<sup>12</sup> shows that the seven terrestrial ecozones in which agriculture is the dominant land use are the most ecologically compromised landscapes in the country and agriculture is a significant (though not sole) contributor. There have been some improvements since the late 1970s when degradation of soil and water resources associated with agriculture became a national policy issue. But Canada now lags behind other countries in the OECD on many agri-environmental measures<sup>13</sup>, and international markets have started to take notice, in some cases demanding that Canadian producers demonstrate their compliance with environmental performance protocols.

There is no clear data on when Canada's agricultural practices might so degrade the resource base as to threaten its long-term productivity and national food security. However, the system is fragile. Input costs continue to rise while the pace of productivity gains has declined, often a sign that soil and other biotic resources are under stress. Many indicators of biodiversity on farmed landscapes are in long-term decline. Farming systems are highly vulnerable to market (e.g., BSE) and climatic (e.g., increased weather variability) shocks.

### **4.1.1 Soil degradation**

#### Summary of the issue and causes of problem

Soil degradation generally results from too much bare soil and sometimes inappropriate patterns of irrigation. Bare soil is generally caused by inappropriate crop rotations, excess tillage, and inadequate shelter for fields or combinations thereof. When soil is bare, it is more subject to deterioration in soil structure, wind and water erosion.

According to published AAFC data for 1996<sup>14</sup>, the highest bare soil days were found in the most intensive production areas of Canada - the Fraser Valley of BC, the southern Prairies, southern Ontario, the St. Lawrence River Valley, the St. John River Valley and parts of PEI. Although there have been overall improvements since 1981, the story is less positive in most of these areas, with generally only small positive changes over a 15 year period, and a slight worsening of the situation in the St. Lawrence lowlands. Although tillage and summerfallow practices have improved, their benefits have been offset by increases in crops and cropping systems, such as canola and soybeans, that do not generate much soil cover<sup>15</sup>. Pockets of high to severe water and wind erosion and soil compaction are found in these same regions<sup>16</sup>.

#### Current government view of problem and activities

Canadian governments understand the importance of improving the soil resource. Since the alarm bells began ringing vigorously in the late 70s, reversing soil degradation has been at the centre of Canadian agri-environmental policy. Significant, and successful, efforts have been made to reverse soil degradation, including major investments in research, soil conservation programs, and extension. Many soil quality indicators have improved, some significantly, since 1981<sup>17</sup>.

#### Key barriers to change, including governance obstacles

The main barriers to significant advances centre on governments' excessive focus on reduced tillage, without sufficient attention being paid to cropping system design. Although there have been improvements, most farmers in Canada do not practice optimal crop rotations to minimize soil degradation, both in length and variety of crops. Government supports to crop rotation changes are minimal, with more energy devoted to researching and promoting minimal tillage, particular zero-till<sup>18</sup>. However, minimal tillage is frequently implemented without significant lengthening and diversification of the crop rotation, which often increases reliance on herbicides and, in some cases, fungicides. Zero-till requires significant capital investments in new equipment. As well, the benefits of zero-till for soil organic matter accumulation - a central strategy for reducing soil degradation - may well be overestimated<sup>19</sup>, casting a shadow on government investments. Part of the current emphasis on zero-till can be traced to its ease of implementation relative to cropping system change. Cropping system change is usually

management intensive whereas zero-till requires investment in equipment (and management to work properly with the equipment). As discussed above, agricultural researchers have a bias towards technology-based rather than management-based solutions.

#### Solutions that are not receiving suitable attention

- Organic farming (see section 5)
- Legislated crop rotations to increase soil cover. Only PEI has implemented measures in Canada, focussing particularly on minimum three year crop rotations for potatoes. The measure is very controversial and its success has yet to be determined.
- Crop rotation insurance is an idea that has been discussed but few jurisdictions have attempted it yet. In this concept, farmers are insured against losses that might occur as they adjust their farming system.

#### **Rating**

Seriousness of Problem: Under stress, with Moderately High problems in some regions and Subsiding ratings in some others.

Potential for significant improvement with suitable investments : 4

High over the medium term. It is technically feasible to lower degradation levels to near the natural soil degradation rate, but it requires significant investment in financial, market and technical supports to farmers.

### **4.1.2 Water pollution and scarcity**

#### Summary of the issue and causes of problem

Agriculture is a significant contributor to water quality problems, both acute ones associated with spills and more chronic ones, such as excess nutrient runoff into streams from regular farm practices. Good Canadian data is lacking, but the annual cost of damage to water from agricultural practices in the U.S. is estimated at \$2.6 billion<sup>20</sup>.

The main risks to water quality from Canadian agriculture are associated with nutrients - animal manure and synthetic fertilizer. Regions with high risk of surface water contamination by nitrogen include the Fraser Valley of BC, south western Ontario, and parts of the St. Lawrence lowland<sup>21</sup>. Nitrogen contamination is usually associated with intensive livestock production and intensive annual cropping with crops requiring significant amounts of nitrogen.

A significant part of the problem is created by the increased number of farm animals on the Canadian landscape. Over a 60-year period, cattle and hog populations have doubled, while the number of farms has dropped by 2/3 and cultivated area has increased more slowly than animal populations. Intensive Livestock Operations (ILOs) have received considerable attention of late related to water quality threats. In Canada, the main ILOs are producing hogs (particularly in

Manitoba, Ontario and Quebec) and cattle in feedlots (especially in Alberta). Water contamination results from application of manure beyond the absorptive capacity of the land, surface runoff and spills from manure storage facilities.

Pesticide contamination is generally a more localized problem, though often highly significant. Fish kills in PEI streams, associated with mostly “normal” farm applications of the pesticides endosulfan, carbofuran, mancozeb, chlorothalonil, and azinphos-methyl in potato fields, have forced the provincial government to bring in a suite of regulatory and program measures to prevent future kills. The incentive to act was provided in part by very negative publicity for the PEI tourism industry, and the associated negative impacts on tourism revenues.

Surface waters have received most of the attention, but concerns about agricultural contamination of ground water is growing. This is not a well-studied or resourced area at this point.

Regarding scarcity, nationally, agriculture uses about 9% of water withdrawn (excluding food processing) and only returns about 30% of it to source<sup>22</sup>. Most of the rest is cycled through various biological and climatological processes. Water use efficiency is not high in agriculture, although demand management is slowly being implemented. Water availability is a limiting production factor on much of the Prairies. Irrigation is a significant activity in a few regions (e.g., southern Alberta) and there are looming tensions over water taking.

#### Current government view of problem and activities

After years of limited attention to water quality impacts in agriculture, most governments have significantly stepped up their regulatory and enforcement activity, much to the consternation of the farming community. In the view of some regulators, the agriculture sector had a 10-15 year window to voluntarily comply with regulations and reduce water quality impacts, but failed to make significant progress. The farm sector, in response, believes that it is unfairly expected to carry the financial burden of environmental improvements that have more off-site than on-site benefits. If the proper financial incentives are in place, they believe it will be much easier to comply with regulations. Tensions are now apparent between agricultural and natural resource departments across the country over the handling of water quality enforcement.

Most governments with significant water quality problems are using both regulation and programming to advance improvements. As part of APF programming, all provinces are instigating or improving environmental farm planning. The PEI government is undertaking a series of initiatives to support potato farmers particularly by providing per acre payments to support the conversion to IPM. Ontario is introducing extensive regulations regarding manure management. Several years ago, Quebec instituted nutrient management rules to reduce in particular phosphorus pollution.

Significant research attention goes to drought resistant plant breeding, and to the design of Prairie cropping systems that reduce moisture demands. Irrigated districts are implementing plans to improve irrigation efficiency.

#### Key barriers to change

There is significant tension between different levels of government and between federal government departments over water quality monitoring and pollution prevention. These tensions revolve, in part, around the appropriate mix of sticks and carrots. At a federal level, these differences of opinion are being played out within APF environment pillar programming, slowing down coherent and coordinated programming

#### Solutions that are not receiving suitable attention

As with other environmental programs, there is excessive emphasis on best management practices (BMPs) and insufficient attention paid to farming systems that reduce pollution (see discussion of organic systems in section 5). A number of jurisdictions in the U.S. and Europe have had success organizing sub-watershed projects, sometimes in collaboration with water utilities, where all the farms in the sub-watershed convert to a sustainable production system. There are tentative steps to initiate some projects of this type in Canada.

#### **Rating**

Seriousness of Problem: Moderately high

Potential for significant improvement with suitable investments : 2

Low in the near term until internal disputes are sorted out.

### **4.1.3 Greenhouse gas emissions and climate change impacts**

#### Summary of the issue and cause of problem

The food and agriculture system in North America is a major contributor to greenhouse gas emissions and is highly energy inefficient:<sup>23</sup>

- In 1945, one calorie of energy input into corn production yielded 4 calories of energy output. This return diminished to 2.4 calories output for every 1 calorie input by 1979. Energy use is higher for fruits and vegetables and highest for animal products. Fruits and vegetables require 2 calories input to yield 1 calorie of output while animal proteins require 20 to 80 calories of energy input for 1 calorie of energy output.
- The food system uses somewhere between 12 and 20% of all energy consumed.
- Up to 13% of food system energy consumption is for transportation of foods. The average food molecule in North America likely travels about 2000 km, largely on non-renewable fuels.

Globally, agriculture alone (not the entire food system) is thought to contribute 21 to 25%, 57% and 65 to 80% of total human-related emissions of CO<sub>2</sub>, methane and nitrous oxide<sup>24</sup>.

Farming in Canada contributed (with fossil fuel use included) about 13% of total 1996 Canadian greenhouse gas emissions, up 4% from 1986<sup>25</sup>. The main Canadian agriculture emission sources are:

- For carbon dioxide (CO<sub>2</sub>): breakdown of soil organic carbon, consumption of fossil fuels, use of synthetic pesticides and fertilizers;
- For methane (CH<sub>4</sub>) : liquid manure tanks, animals;
- For nitrous oxide (N<sub>2</sub>O): inefficient, ineffective or inappropriate use of nitrogen fertilizers resulting in significant nitrogen release to water and air.

N<sub>2</sub>O and CH<sub>4</sub> are priorities for reduction<sup>26</sup>, since agricultural soils are now thought to be net CO<sub>2</sub> sinks and emissions from agriculture represent only 1% of Canada's total CO<sub>2</sub> emissions. In contrast, primary agriculture in Canada accounts for 61% and 38% of Canada's total emissions of N<sub>2</sub>O, and CH<sub>4</sub> respectively<sup>27</sup>. Over half of all agricultural GHG emissions are N<sub>2</sub>O<sup>28</sup>. 50-75% of annual N<sub>2</sub>O emissions occur during the spring, around snow melt and planting. 42% of GHG emissions are associated with the livestock sector<sup>29</sup>, particularly, most CH<sub>4</sub> emissions which are associated with animal digestion (almost all of it from beef and dairy) and manure management<sup>30</sup> (also N<sub>2</sub>O and emissions). The most significant emissions from the cropping sector are associated with synthetic nitrogen fertilizer (12 Mt CO<sub>2</sub>eq in 1996).

Agriculture is also projected to experience major impacts from climate change<sup>31</sup>. In general, if temperatures rise more than 2 degrees C over the next 40 years (as projected), any yield benefits from longer growing seasons, increased temperatures and higher atmospheric CO<sub>2</sub> levels are likely to be offset by increased moisture deficiencies or excesses, heightened pest and disease pressures, and in some areas the related phenomena of increased air pollution and UV radiation.

Impacts are projected to vary by region and crop, with the more northern areas of production benefiting. Drought is likely to be exacerbated in many areas of the Prairies and the loss of snow cover in Eastern Canada may contribute to additional erosion problems and pest pressures. Greater climate variability, including more violent storm events, is likely to exacerbate the boom and bust cycles of farming, put more pressure on farmers' management capacities and income streams, and ultimately further strain on Canada's farm financial safety net system. All this means that Canadian agriculture is unlikely to experience a significant net benefit from climate change.

#### Current government view of problem and activities

Significant investments have been made in modelling impacts of climate change on agriculture and researching specific technologies and practices that can reduce emissions. Grant programmes have focussed on building farmer awareness of emission production and adaptation challenges, with some money available for commercializing new technologies.

However, there does not appear to be a coherent and comprehensive plan to ensure agriculture contributes its share to achieving Kyoto targets. AAFC aims to reduce GHG emissions by 20% of the current total, or about 17 Mt CO<sub>2</sub> equivalent, 10-11 Mt of which they hope will come from soil C-sinks (current estimates are 9.7 Mt). This hope is based on estimated carbon storage from minimum tillage, particularly zero till. As discussed above, the C- storage capacity of zero till systems may be significantly overestimated. One reason AAFC appears to be putting so much hope into carbon sequestration is that the core emission problems require significant changes to the way the agricultural landscape is managed. To effect changes in animal populations and synthetic nitrogen use requires significant interventions of the type pursued in Europe, but generally avoided in Canada.

### Key barriers to change

AAFC relies on an approach to agri-environmental program design that is unlikely to be effective in helping farmers adopt the kinds of substantial changes that will reduce GHG emissions. The agricultural policy tradition in Canada is largely framed by market activities and private property considerations. Policy makers do not consider it their mandate to “pull” farmers towards farm and land use management that serves national policy objectives. Nor do policy makers like to use or enforce regulation, except in cases of acute threats to health and the environment. Instead, governments typically set out voluntary and modest incentives to encourage changes, without necessarily putting in place formal systems to support farmers undertaken significant conversions. The international literature on agri-environmental programming concludes that these approaches do not work effectively when substantial changes in environmental performance are required<sup>32</sup>.

### Solutions that are not receiving suitable attention

To reduce these kinds of emissions, the International Panel on Climate Change (IPCC) has concluded that, in general, mitigation practices should: a) enhance sustainable production; b) have additional benefits for farmers, including profitability; and c) generate products that are suitable to consumers<sup>33</sup>.

To date, most of the agriculture and climate change literature (including government option papers) has focussed on specific practices to mitigate the effects of climate change, not the broader strategies proposed by the IPCC. Although they have the potential to reduce emissions and increase sequestered carbon, it is likely that a focus on agricultural systems, rather than stand-alone measures, would provide even greater GHG reductions, while at the same time offering a host of co-benefits. Systems such as organic, agroforestry, pasture and rangeland, and alternative biofuel cropping systems, include many of the practices touted as GHG reduction strategies. However, systems are more than combinations of individual agronomic practices. Systems adoption often produces a fundamental and permanent land use change. Monitoring for compliance is very difficult in a practice-based approach, but with systems, monitoring is not without challenges, but more straightforward. Finally systems have the potential to generate greater profitability (e.g., organic food).

**Rating**

Seriousness of Problem: Moderately high

Potential for significant improvement with suitable investments : 4 High

This is not a well studied area, but preliminary estimates by World Wildlife Fund Canada suggest that 30% of agriculture's target can be met with emissions reductions, carbon sequestration and carbon offsets associated with modest (5-10% land area) adoption of organic farming, agroforestry on grasslands and biofuel production from C4 crops.<sup>34</sup> A moderately aggressive program of supports to farmers to undertake these conversions would cost in the order of \$200 million annually for 10 years, roughly 5% of recent annual expenditures on agricultural supports.<sup>35</sup>

#### **4.1.4 Loss of agricultural land**

##### Summary of the issue and cause of problem

Only about 11% of Canada's land mass is considered suitable for farming, and less than 1% of that falls into the best farmland category (Class I of VII classes). Almost all Canada's class I land is located near cities and 50% of it is in Ontario<sup>36</sup>. The importance to farmers of preserving prime agricultural land is apparent from productivity data: given the same agricultural inputs, Class I land will produce 100 bushels of corn, while Class IV land will produce 49 bushels<sup>37</sup>.

The two main interacting forces resulting in farmland loss are urbanization and low farm incomes. Unfortunately, land that is good for farming is also generally the least expensive for housing development. Farmers are generally cash poor and land and capital equipment rich, so in peri-urban areas with significant population growth, these factors of production essentially become their retirement income. Urban land use policies that contribute to sprawl rather than intensification exacerbate the situation. Farm land is also lost when farms are abandoned in marginal production areas, although these are not necessarily permanent losses.

Since 1971, urbanization has consumed an area of Class I, II and III farm land equivalent in size to PEI. Some of these lands are for speciality crops - e.g., grapes and some vegetables - that can only be grown successfully in a limited number of areas (e.g., Niagara region, Fraser Valley). The quantity of land in these classes available for farming is now in decline and urbanization is a significant, though not sole, contributor<sup>38</sup>.

##### Current government view of problem and activities

Aside from a major monitoring program that existed in the 1970s and 80s<sup>39</sup>, the federal government has largely, for jurisdictional reasons, left this issue to the provinces. The provinces with most of the prime farm land and the most acute problems - BC, ON and QC - have taken different approaches to the problem. Their successes have partly been determined by the approach and partly by the political frameworks of the party in power. How governing parties have viewed the balance between societal objectives and private property rights has been a central determining factor.

Ontario provides a particularly visible example of this process. While legislation and programs remain viable (although weakened) in BC<sup>40</sup> and Quebec<sup>41</sup>, Ontario has consistently converted the highest amount of prime agricultural land by area and by percentage of all land converted to non-agricultural uses. The Foodland Guidelines were put in place in the late 1970s to guide (but not regulate) municipal land use planning. Farmland losses amounted to about 2% of agricultural land per year. However, if not for the actions of several municipalities that actually did design official plans with real concern for protecting agricultural land, this loss could have been much higher<sup>42</sup>. Even with these actions, a 2% loss per annum added up to a 33% loss over a 20-year period. Over a 50-year period, agricultural land lost around the Greater Toronto Area has amounted to 52%.<sup>43</sup> While 70% of all agricultural land converted to non-agricultural uses in the 1970s in Ontario was Class 1, 2, and 3 land, this figure had risen to 85% by the mid-90s, in spite of the Foodland Guidelines<sup>44</sup>. 18% of Class I Ontario farmland is now used for urban areas rather than farms<sup>45</sup>. The NDP introduced new land use planning measures late in their mandate with programming to support preservation of tender fruit lands that could have protected agricultural land, but the Conservative government eliminated these measures upon taking office in 1995<sup>46</sup>. It appears the current Liberal government address some of these problems, with initiatives such as the Greenbelt Task Force and Discussion Paper, Planning Act Reform and Implementation Tools, Ontario Municipal Board Reform, Provincial Policy Statement Draft Policies, and the just announced “Places to Grow” initiative.

#### Key barriers to change

The key barrier is the disparity between the value of generating economic rents from land for food production and for housing. Given the value of food to human survival, the land market is highly dysfunctional. The current market realities can only be viewed as rational if markets believe that food production can happen pretty much anywhere, with efficient and low-cost transport from locations of production to locations of consumption. However, as discussed above, there is tremendous variability in land quality which seriously impacts on food production potential, and long distance transport is only feasible when many of the costs of long distance transport are externalized.

Related to this land market dysfunction is an accompanying set of often problematic land use policy measures, including property tax assessments, lot severance rules, and measures that encourage extensive suburban lot development.

#### Solutions that are not receiving suitable attention

Canada has tended to focus on agricultural zoning, but a full suite of instruments have been tested in a variety of other jurisdictions, with varying degrees of success<sup>47</sup>. Only a few of these are currently receiving significant consideration in Canada at policy levels (although greater exploration is happening amongst some academics and NGOs<sup>48</sup>). Of course, saving agricultural land requires a comprehensive mix of interconnected elements for success: viable farm businesses, a vigorous rural economy, thriving villages and small towns, permanent urban

boundaries, and a countryside of valuable and appreciated amenity value. See other sections for discussion of some of these other critical elements.

### **Rating**

Seriousness of Problem: Under stress, with moderately high ratings around some urban areas.

Potential for significant improvement with suitable investments : 3

Canadian provinces have used a variety of instruments and others have successfully been used in the U.S. and Europe. Although for some measures Canada's tax regime and legislation require change (e.g., agricultural conservation easements in provinces like Alberta), by and large, there are known measures for addressing these land use challenges. Significant improvement, however, is highly dependent on the commitments of governing parties.

### **4.1.5 Biodiversity - loss of species and habitats**

#### Summary of the issue and cause of problem

Agriculture, as practised in Canada, has largely been a force reducing biodiversity. This has happened as a result of numerous activities:

- The destruction of native habitat when farmland is created. For example, 93% of Prairie ecozones are in agriculture and only 1% of the tall grass prairie, 19% of the mixed grass prairie and 16% of aspen parkland remain<sup>49</sup>. One of the likely impacts is that over half of bird species in the Breeding Bird Survey are in decline on the prairies, particularly grassland species<sup>50</sup>.
- The destruction of corridors and habitat adjacent to farmed fields. Agriculture is a major cause of habitat fragmentation, with disconnected parcels of woodlots across the landscape, and the elimination of field borders that serve as corridors for wildlife movement.
- Pollution from agricultural practices (e.g., synthetic pesticides, synthetic fertilizers, soil and manure runoff associated with poor management) disrupts terrestrial and aquatic ecosystems and changes wildlife populations. Pesticides kill many non-target organisms, especially birds and insects. The cost of pesticide damage to all natural capital in the U.S. is estimated at \$3.70 / kg of active ingredient applied<sup>51</sup>.
- Simplification of agroecosystems (e.g., very limited crop rotations that result in vast acreages in only 2 or 3 crops, and poor range management) removes habitat and food sources.
- Weed management practices (excessive tillage, herbicides, herbicide - tolerant (GE) crops) that eliminate food sources and disturb ground habitats
- Poor management of wetlands, streams and riparian zones on farm properties, including excessive access to these areas by grazing animals.
- Introduction of exotic species (plants, pests). Agriculture is a major source of new species introduction to natural ecosystems.

### Current government view of problem and activities

The federal government and some provinces do have biodiversity conservation strategies as responses to the Convention on Biological Diversity. However, these strategies are by and large vague, and implementation on the broad scale has generally been modest. Individual farmers have worked to create habitat for wildlife, often supported by NGOs like Ducks Unlimited, the Nature Conservancy or World Wildlife Fund (WWF). Provincial governments or their paragonovernmental agencies have often played a significant role in such projects.

The new APF has identified biodiversity conservation as a priority area although targets and performance measures are not yet well developed. Two environment pillar programs are being implemented to improve biodiversity - Environmental Farm Planning and the Greencover Program - but their effectiveness is unclear at this point, and criticisms have been levelled at both programs.

### Key barriers to change

There is little landscape level planning in agriculture. In fact, agriculture as a profession and practice does not have a design and planning culture. Even if there were such a culture, at this point, private property rights in agriculture so trump collective interests that putting in place mechanisms to encourage collaboration across farms is proving difficult. As well, agricultural professionals generally do not examine how the working landscape can be altered to support biodiversity, focussing instead on the so-called non-productive margins. These margins are important, but the effectiveness of managing the margins can be significantly complemented or undermined by how cultivated land is managed. This receives little attention. Finally, many in agriculture still view wildlife as pests to be controlled or eliminated rather than managed to optimize both environmental and economic performance.

A significant policy barrier arises from the difficulty scientists are having developing biodiversity conservation performance measures. This is a complicated area, and given the current role science plays in formulating much of agricultural policy, scientific confusion on this question is holding up program design.

### Solutions that are not receiving suitable attention

- Farming systems that conserve biodiversity on the productive landscape (see section 5)
- Regional conservation initiatives, based on watersheds or important terrestrial features, that provide incentives for farmers to collaborate.

**Rating**

Seriousness of Problem: Moderately high, with High ratings in some localized regions where agricultural practices are contributing to endangerment of species.

Potential for significant improvement with suitable investments : 3

Although projects show promise on a farm-by-farm basis, the challenges of producing change on a wider scale, including regional collaboration, are significant and the infrastructure to address them not well developed at this point.

#### **4.1.6 Genetic resources and genetic engineering**

##### Summary of the issue and cause of problem

Domesticated plants and animals are some of the foundational elements of food production. Their genetic evolution, much of it manipulated by humans over a 10,000 year period, has been central to growth in agricultural productivity. Two interconnected trends, however, threaten the genetic resource base.

A central problem of plant and animal breeding the past 30 years is the narrowing of traits of interest. Historically, breeders have been primarily concerned with yield and resistance to disease<sup>52</sup>. That focus, combined with the privatization of breeding work and associated supporting intellectual property protections, has progressively narrowed the number of varieties and breeds considered commercially desirable. Concurrently, the same genetic material has been used in a high percentage of varietal and breed lines as breeders draw on this narrow range of desired traits. With a high number of varieties and breeds having common genetic material, crops and animals are rendered more vulnerable on a grand scale to environmental stresses<sup>53</sup>. This process also results in effective extinctions of domesticated plants and animals, ones that then can no longer provide new genetic material should it be required in the event of major perturbations.

A more subtle, but equally problematic result is a narrowing of the range of optimal environment conditions for growth. Many plant varieties are now only competitive against pests in highly controlled environments where agri-chemicals are used. These varieties are not necessarily suitable in low-input and environmentally sustainable systems. Similarly, many animal breeds are only productive in highly controlled environments. For example, some breeds of broiler chickens in caged environments grow muscle tissue so quickly relative to their bone structure that they are unable to walk properly outdoors.

Genetic engineering is in many ways the ultimate expression of this desire to manipulate genetic traits and expressions. Proponents of GE claim that the technology is closely related to other forms of breeding. But for agroecologists, the capacity to use recombinant DNA technology to rapidly create transgenic organisms is a startling departure from earlier approaches, and one with potentially enormous ecological implications. A fundamental assumption of this technology is

that biological organisms are explained primarily by their genes. The influence of environment on genes receives less attention. In this way, organisms are seen to be somewhat independent of their ecological context, phenomena are examined as more discrete manageable explanations, and small samples can be inductively generalized as representative of universal phenomena.

In practical terms, ecologists are worried about:

- the movement of transgenes to related varieties and wild relatives and the implications for community dynamics
- increased reliance on herbicides to manage herbicide-resistant crops<sup>54</sup> and related negative impacts on non-target organisms<sup>55</sup>
- agroecosystem simplification resulting from the loss of weed populations that feed other organisms<sup>56</sup>
- negative effects of *Bacillus thuringiensis* (Bt)- crops on non-target organisms, particularly beneficial insects and soil organisms<sup>57</sup>.

Evidence is just now emerging of these problems and is largely coming from independent scientists, not GE companies or regulators.

#### Current government view of problem and activities

The federal government is deeply committed to genetic engineering as an economic development driver and has only a limited commitment to conserving genetic diversity. The GE regulatory system has been designed to superficially assess environmental impacts so that commercialization is not significantly impeded. As long as industry can demonstrate that their GE varieties are “substantially equivalent” to their conventional analogs, no full environmental assessment will be required. To date, no applications have required a full environmental assessment, despite evidence that the data for environmental assessment is deeply flawed in some applications<sup>58</sup>. This regulatory approach was criticized by the Royal Society of Canada report on GE regulation in 2001<sup>59</sup>.

Canada has a seed gene bank and regionally specialized nodes of activity for rejuvenating germplasm. Attention to issues of animal genetic resources has developed more slowly, with AAFC largely still in the assessment stage, collaborating with animal breed organizations and international bodies such as the Food and Agriculture Organization (FAO). These areas are all underfunded relative to the potential significance of the issues. Some in-situ conservation work is currently being carried out by NGOs on limited budgets.

#### Key barriers to change

The federal government commitment to genetic engineering as an economic development sector is compromising environmental and health assessments. There are few ecologists involved in preparing industry submissions and government review. The review field is dominated by molecular biologists and geneticists.

Regarding genetic conservation, the significant barrier remains the economic forces narrowing the genetic resource base and the failures of governments to properly move to correct this market failure.

#### Solutions that are not receiving suitable attention

Some organizations have presented different approaches to GE regulation<sup>60</sup>, based in part on the precautionary principle and societal impact analysis. These are not receiving significant attention from regulators. Similarly, organizations have made proposals on how to revamp the systems for conserving plant and animal genetic resources<sup>61</sup>, based on farmers' rights to genetic material, in-situ conservation, and limitations on corporate control of the seed and animal gene sectors.

#### **Rating**

Seriousness of Problem: Under stress, for some domestic animal species the rating is High, based on essential extinction.

Potential for significant improvement with suitable investments : 2

Although the knowledge exists to change systems related to GE regulation and genetic conservation, the current approaches are deeply entrenched within professional and bureaucratic circles.

## **4.2 Economy**

Canada is committed to the current global food trading system. Roughly half Canada's domestic production is exported. Although Canada thinks of itself as an exporting nation, it is also a major importer. Import - export trends demonstrate that Canada's reliance on the global trading system continues to increase. From 1987-2002, exports have risen 224% by dollar value and imports by 278%. The federal government wants Canada to account for 4% of global agri-food exports by 2005, up from a 3.3% average in the 1960-1996 period, a 21% increase. When the bulk cereal and animal trades are removed from the equation, imports in fact match exports, suggesting that reliance on imports of food other than bulk grains and animals is increasing as a consequence of this export focus.

However, commitment to the current global trading system brings with it significant vulnerabilities, ones that governments have not really acknowledged. Without providing any evidence or argument, federal government documents<sup>62</sup> suggest it is possible to construct a freer trading system that optimizes sustainability and health. Agroecological theorists, in contrast, have concluded this is impossible because of the ways such trading breaks many fundamental rules of ecology<sup>63</sup>.

#### **4.2.1 Low farm income**

##### Summary of the issue and cause of problem

Canadian agricultural policy continues, directly or indirectly, to create economically difficult conditions for farmers. For over 30 years, farmers in the Western world have been caught in a cost-price squeeze in which they have little control over input or output prices<sup>64</sup>. During this period, input prices have been rising more rapidly than input productivity or output prices<sup>65</sup>. Realized net farm income adjusted for inflation is essentially zero in Canada because input costs have continued to rise while prices remained low<sup>66</sup>. For the first time since record keeping started in 1926, 2003 net farm-income in Canada was negative. Now, according to Statistics Canada data, more than 50% of farm family income is derived from off-farm sources<sup>67</sup>. Consequently, the number of farmers and farm workers continues to decline (a net loss of around 11% of farmers from 1996-2001<sup>68</sup>).

The dilemmas lie in the individual farmer's position as a price taker, not a price setter. To gather economic power, farmers traditionally organized themselves into production and marketing structures that counterbalanced the market power of food corporations. As it relates to marketing boards, in many cases, provincial and federal governments facilitated this process<sup>69</sup>. However, with globalization (see next section), and associated agreements such as NAFTA and the WTO, the ability of individual farmers to control input and commodity prices has eroded even further and the pressures to dismantle organizations of farm market power have become more intense.

##### Current government view of problem and activities

The federal approach to improving farm income involves expanding markets, encouraging farmers to become more efficient, and providing financial safety nets to cover disastrous events. As some farm organizations have pointed out, however, while farmers have increased production, efficiency and market penetration, their net income has continued to deteriorate<sup>70</sup>. The federal government believes it has put in place safety nets that adequately cover most circumstances confronted by farmers. In contrast, farm organizations view them as inadequate, including the program established under the new Agricultural Policy Framework. They believe the designs of these programs, and the resources devoted to them, cannot deal with the swings of market and climate conditions now confronting producers. There have been some modest modifications introduced by the federal and provincial governments to respond to these criticisms, but not enough to assuage farmer concerns.

Canadian governments have generally remained committed to market boards, although their strength is gradually being eroded by global trade agreements signed by the federal government.

##### Key barriers to change

Since the early 70s, governments in Canada have been reluctant to address the larger structural problems of the food and agriculture sector<sup>71</sup>. Instead, the fundamental premise is that the food market place works, and governments need only intervene in modest ways to moderate

problematic behaviour. Economic and political power in the food system rests now primarily with the retail sector, not with farmers<sup>72</sup>. In the absence of a national food policy (see section 6) and a powerful political constituency, it has been difficult to liberate sufficient funds to stabilize farm incomes.

#### Solutions that are not receiving suitable attention

Jurisdictions in Europe and the U.S. have implemented a variety of schemes to both stabilize farm incomes and effect environmental improvements (see section 6). Progressively, income support measures are being decoupled from level of production. With these environmental improvements, farmers are often able to reduce input costs, particularly for synthetic fertilizers, pesticides and animal health products and services, which improves net income in many cases (see section 5).

#### **Rating**

Seriousness of Problem: High.

Potential for significant improvement with suitable investments: 2.

It is not obvious that any governing party will take on this challenge because of its complexity and political implications.

#### **4.2.2 Effects of globalization and corporate concentration**

##### Summary of the issue and cause of problem

Since the early 1980s, national food economies have been progressively dismantled and global movement of food and agriculture goods and services has accelerated<sup>73</sup>. In this process, policies that favoured farms and food distributors within national boundaries have been amended or eliminated in favour of measures that facilitate competition across national boundaries. Related to this, national food safety, animal health and phytosanitary rules have been harmonized. To compete in this environment, agrifood firms have increased in size, usually through acquisitions and mergers. There has been a significant reduction globally in the number of firms controlling food trade. For example, six transnational corporations (based primarily in the U.S. and Europe) control 85% of the world's grain trade<sup>74</sup>.

In Canada, the growing economic power of a small number of agrifood companies predates the globalization phenomenon, but has certainly accelerated since the early 1980s. Since then, corporate concentration has existed in most sectors of the Canadian food and agriculture system, especially in fruit and vegetable canning, frozen fruit and vegetable processing, confectionary, soft drinks, biscuits, distilleries and breweries, and retailing<sup>75</sup>. Ownership (or at least control) of large firms is generally not widely held in the agrifood sector where many of the largest firms are family owned or controlled, and under no or limited obligation to report on their activities and financial performance<sup>76</sup>.

A central purpose of concentration is to control the prices of inputs and outputs, to improve market share and, as much as possible, predict and influence consumer shopping and eating behaviour. At a retail level, the pressure to control these factors has increased with the entry of low cost food distributor WalMart into Canada. Loblaw's, the market leader, has significantly reshaped its operations to reduce consumer prices for some of its product lines, with the attendant negative financial implications for farmers and suppliers. These realities and the forces described in the previous section contribute to depressed farm incomes.

It has been known for some time, that these kinds of financial stresses on farmers have negative impacts on the rural economy and social fabric<sup>77</sup>, and on the health status of farm families<sup>78</sup>. A diverse array of studies over the past 40 years "have rather consistently shown that a change toward corporate agriculture produces social consequences that reduce the quality of life in rural communities"<sup>79</sup>. Since the late 80s, farm bankruptcies have episodically occurred at the highest levels since the Depression, and one estimate has seven farmers leaving farming for every one that remains to go bankrupt<sup>80</sup>. Some U.S. investigators have concluded that 3-5 jobs are lost per farm failure, and that one rural business fails for every six farms that go out of business<sup>81</sup>.

For the environment, there are a number of significant implications. Globalization has dramatically increased food miles - the miles food travels from producer to processor to consumer - and greenhouse gas emissions (see section 4.1.3). Corporate concentration has facilitated contract farming, a situation where farmers act more as labourers for processing firms, carrying the risks of production, but managing their operations according to rules determined by the processor. This has particularly been the case in some animal production sectors and vegetable and fruit processing. Environmental stewardship is often not a part of these contract relations.

Low farm incomes are also a significant reason why farmers are reluctant to invest in environmental performance. They are generally left to pay the costs themselves, with little hope that the market place will reward them for their efforts. This distancing in the food system may also be reducing nutritional quality (see section 4.3.3).

#### Current government view of problem and activities

This is a poorly studied area in Canada. The federal view appears to be that globalization is largely a positive phenomenon. Although governments have fought to protect certain instruments of national policy such as marketing boards (albeit in modified form), they have also complied with many features of international trading agreements, especially related to removal of production and transport supports and harmonized food safety rules. The federal government is not directly addressing high levels of corporate concentration in the food system and the Competition Bureau has not been very active in this area the past few years<sup>82</sup>.

#### Key barriers to change

Government commitments to globalization and international trade regimes is the key barrier.

Solutions that are not receiving suitable attention

Policy measures to support import substitution and self-reliance receive little attention. See section 6 for more.

**Rating**

Seriousness of Problem: High

Potential for significant improvement with suitable investments: 1

Low in the near to medium term

**4.2.3 Lost economic opportunities associated with reliance on an import-export economy**

Summary of the issue and causes of problem

The limited empirical research conducted in Canada suggests that overproduction of grains and certain animal products at the expense of fruits and vegetables has not necessarily improved farm income or consumer welfare. Relative to retail prices and farmer cost of production, farm gate prices for grain and hogs have been low for years and realized net farm income continues to decline, despite productivity gains. Consumer prices for further processed goods have risen substantially over this period of flat farm gate prices. Fruit and vegetable consumption and prices have been rising, but farm gate prices, while climbing since 1971, have had significant rate of increase declines since the 1990s. Typically in the OECD, the value of agricultural production is captured largely by input suppliers, processors and retailers<sup>83</sup> and that additional value is paid by consumers in increasing prices. If that value capture was producing increased employment in the food processing, distribution and retailing sectors, there might be a case for societal benefits despite financial penalties for farmers and consumers.

However, job losses, or shifts to low-wage jobs, in the food industry have paralleled those in other economic sectors. In certain sectors there have been significant reductions in the number of food and beverage-manufacturing establishments. For example, the number of fruit and vegetable processing firms in Ontario declined from about 230 in 1948 to about 45 in 1987<sup>84</sup>, and given recent reported consolidation, is likely even lower now. Much of the concentration in the food sector has come about as a result of the cascading and progressive takeover or elimination of smaller, local, regional and national firms by multinationals. These large firms are able to maintain their dominance, and hence limit diversity, by creating an environment unsuitable for new entrants.

Not only may there not be the claimed net economic advantages from Canada's reliance on an export- import agricultural economy, but the country may additionally be losing economic opportunities. Although Canadian data is limited, there is some evidence from international

studies that export economies reduce local economic multipliers<sup>85</sup>. In other words, Canada's food system, which currently employs 1 person in 7<sup>86</sup>, could actually be a greater contributor to employment than it currently is.

#### Current government view of problem and activities

As discussed above, Canada is firmly committed to the current global food trading system. The federal government is planning for Canada to account for 4% of global agri-food exports by 2005, up from a 3.3% average in the 1960-1996 period, a 21% increase. Consequently, it invests millions annually in food export promotion. There is limited interest in supporting localization of the food economy. Consumer welfare is evaluated primarily by food costs relative to income, which are the second lowest in the world, and by apparent variety in food choices (see further discussions below).

#### Key barriers to change, including governance obstacles

- 200 years of agricultural history: Canada first designed its agriculture around export to meet colonial obligations
- The dominant agricultural economics paradigm which has long been identified as one of the most conforming in agriculture<sup>87</sup>
- The political clout of bulk commodity and export organizations

#### Solutions that are not receiving suitable attention

Globalization has created a "new focus on regionalism...a social reaction against the global market expansion...emphasising decentralisation, community action, local decision making, and finding a sense of place...the ideas that "place matters" and "scale matters""<sup>88</sup>. See section 6 for more on solutions.

#### **Rating**

Seriousness of Problem: Under stress

Potential for significant improvement with suitable investments: 2, in the short and medium term. Changing this situation is a long-term endeavour.

### **4.3 Nutrition, food safety and health**

In theory, a paramount objective of a food system is the nourishment and health of its population. However, this has never been an explicit objective of the Canadian system, except as it relates to providing food that is safe. On the nutritional side, the delivery of health is more presumed than assured by specific measures.

### **4.3.1 Food insecurity**

#### Summary of the issue and cause of problem

The National Population Health Survey (NPHS) reported that in 1998/99 "over 10% of Canadians, or an estimated 3 million people were living in food insecure households. That is, because of lack of money, at least once in the previous 12 months they worried that there would not be enough to eat, and/or they did not eat the variety or quality of food that they wanted, and/or that they did not have enough to eat"<sup>89</sup>. 2.4 million Canadians - 8% of the population - experienced 'compromised diets' and 1.2 million people - 4% of the population - were found to be food poor'<sup>90</sup>. Social assistance recipients were at much greater risk of poor access to food compared to other income groups and children and young people, single parent (lone mother) families and Aboriginal households off-reserve were at high risk<sup>91</sup>.

Data on food bank usage tell a similar story. The 2003 Annual Hunger Count Survey of the Canadian Association of Food Banks (CAFB) reported that 778,000 people living in Canada (or 2.4% of the population) used a charitable food bank (i.e., resorted to emergency food assistance) in March of that year. Thirty-nine percent of food bank users were children under the age of 18 years.

The food and agriculture system is clearly not the sole contributor to this situation. However, that the food system is set up only to accommodate those who have money is a contributing factor. Matters that are within the control of the food system - food costs, the locations of stores, the ready availability of low cost, nutrient poor foods - all have an impact on food security. Although Canada has the second lowest average food costs in the world, it has created a food distribution system that makes food more expensive at the retail level than it need be. A high level of corporate concentration gives food distributors the power to force consumer costs up, while paying low prices to farmers<sup>92</sup>. A U.S. study using 1975 data found an estimated 6% increase in food prices due to corporate concentration<sup>93</sup>. Relevant Canadian studies are lacking but our levels of corporate concentration are much higher than the U.S., so consumer prices may be higher here as a result. Higher food prices of this magnitude may not be significant to middle and upper income earners, but can be problems for low-income earners. Furthermore, there is some evidence in Canada that low-income households have faced for some time higher retail food prices in their neighbourhoods than middle income citizens do<sup>94</sup>. For example, a 1992 study in Halifax noted a 5% higher price in inner-city supermarkets where many low-income neighbourhoods are located as compared to suburban ones<sup>95</sup>.

#### Current government view of problem and activities

Canada does have an action plan on food security<sup>96</sup>, a response to the World Food Summit in 1996. However, although much has been conceptualized, little has been implemented. The plan itself outlines few specific items, few lead organizations are identified and budgets are not clearly allocated. The Food Security Bureau of AAFC, responsible for coordinating implementation, has few resources to implement changes.

### Key barriers to change

The federal government generally downplays food insecurity in Canada, identifying it as a problem affecting a small percentage of the population. It appears that AAFC is unwilling to recognize the role of the food system in creating food insecurity. There is, however, a willingness in government circles to rely on the charitable sector to address hunger.

### Solutions that are not receiving suitable attention

Several new areas of activity provide indications of a role for the food system in creating food security. One lies in alternative food distribution mechanisms that by-pass much of the dominant food system and link farmers and consumers more directly. In so doing, they have the potential to reduce food costs while providing a higher percentage of the consumer dollar to the farmer<sup>97</sup>. Some projects are collaborations between NGOs, farmers and even municipal governments and involve shifting distribution from private (e.g., supermarket) to public spaces. For example, some NGOs are running food markets in lobbies of social housing complexes or food box schemes delivered to community recreation centres for local pickup<sup>98</sup>. A second lies in the integration of some food system and health care system functions. One of the more intriguing proposals to come forward is having publicly funded health insurance cover the costs of food in cases where a healthy diet is critical to health outcomes such as the risk of low birthweight births<sup>99</sup>.

#### **Rating**

Seriousness of Problem: Under stress

Potential for significant improvement with suitable investments: 4.

Because of its expressed international commitments, the federal government is susceptible to criticisms in international fora that is not doing enough.

### **4.3.2 Food safety systems are not able to ensure safe food**

#### Summary of the issue and cause of problem

In the OECD world, consumer confidence in the food supply has been tested of late. Disease outbreaks, worries about new technologies, and concerns about the ability of regulatory systems to keep up with changes in a globalized food system are all contributing factors. Whether real or perceived, the loss of consumer confidence is worrisome to governments and the food industry and is producing more onerous management and record keeping conditions for many farmers and merchants.

Canada acted early (from the late 1800s) and effectively to put a regulatory apparatus in place to ensure the provision of safe food<sup>100</sup>. This partly explains why Canada's food safety system is viewed as one of the best in the world. However, it now must oversee an increasingly complex

and changing agri-business landscape with numerous challenges, such as the effects of increased long-distance transport of goods, the concentration of processing and production in large-scale facilities, year round access to previously seasonal foods, intensive reliance on chemicals and biocides, and the enormous financial pressures on farmers and small manufacturers<sup>101</sup>. The food safety apparatus now imposes requirements on farmers and processors that favour larger, more centralized operations involved in trade.

#### Current government view of problem and activities

Food safety has long been a key priority of governments, but government's view of its role is shifting. Government, in the era of cutbacks, has moved to new frameworks for program delivery, shifted some responsibilities to the private sector, and changed the inspection process. It appears government may be attempting to shift potential liability to the private sector. Responsibilities and agencies have been reorganized, legislation amended, and new systems for managing risks put in place.

#### Key barriers to change

The system relies on a risk assessment approach that cannot properly identify and address non-acute hazards, the ones that have become more evident with food system change. It does not properly weigh the benefits of technologies that inadvertently generate hazards against their value, or compare their performance to other approaches that might generate fewer hazards. The lack of a prescriptive legislative framework (as is used in Europe and the U.S.) means that implementation is too subject to budgetary pressures, staffing strategies within agencies, competing authority between agencies, efforts to prevent political oversight of bureaucratic activity, and bureaucratic difficulties sorting through conflicting policy directives, including those related to commercialization and trade.

In fact, it is argued by some that the food safety apparatus has actually facilitated the very changes that are now coming back to haunt it, by imposing requirements on farmers and processors that favour larger, more centralized operations involved in trade.

#### Solutions that are not receiving suitable attention

Although the system does have a good reputation for control once outbreaks have occurred, the food safety system is not sufficiently oriented to prevention. Recent BSE and avian flu problems attest to the costs of not sufficiently investing in measures that would minimize outbreaks. The food surveillance system is failing to "see", in both policy and scientific terms, opportunities to significantly reduce the generation of hazards, so that the risks can be reduced or eliminated rather than managed. See section 6 for more.

**Rating**

Seriousness of Problem: Under stress

Potential for significant improvement with suitable investments: 3

Given the extensive nature of changes required, this will be a long-term process.

### **4.3.3 Nutritional value of the food supply appears to be in decline**

#### Summary of the issue and cause of problem

There is some evidence of declining nutritional value in some fruits and vegetables transported over long distance associated with early harvest to meet processor, transport or cosmetic requirements and lengthy periods between harvest and consumption. There can be up to a three week discrepancy between harvest date and optimal levels of vitamin C in some vegetables<sup>102</sup>. With Canada's reliance on trucked fruits and vegetables from California, there can often be a 5-10 day gap between harvest and consumption, with possible losses of some nutritional constituents in the 30-50% range<sup>103</sup>. Does it matter if long-distance transport compromises nutritional value? Probably not for the majority, but most Canadians do not meet guidelines for fruit and vegetable consumption and there exist particular higher risk populations for whom such losses could be significant. .

#### Current government view of problem and activities

This issue is receiving almost no attention from governments. This, despite the fact that federal nutrient data files indicate declines in values of some essential minerals over a 50 year period<sup>104</sup>. Given the current lack of inquiry, the reasons remain unclear but globalization of the food supply could be a factor, as good soil management practices (see section 5).

#### Key barriers to change

Canada's commitment to global trade is the most significant barrier to inquiry about the linkages between food quality and long-distance food transport.

#### Solutions that are not receiving suitable attention

It's too early to identify possible solutions, but should long-distance transport and early harvest to accommodate that prove to be a key element of the problem, then solutions that reduce food miles are likely to be important.

**Rating**

Seriousness of Problem: Emerging, although should research confirm some preliminary conclusions, this could be a major problem.

Potential for significant improvement with suitable investments: 1

Low in the short term. Research required to identify the extent of the problem.

#### **4.3.4 Food de-skilling**

##### Summary of the issue and cause of problem

Although most businesses have not consciously “deskilled” and misinformed their customers, it is a side effect of the rules of a market economy. There are four particularly important dimensions to this process of diminishing food skills: 1) corporate control over the food chain (discussed above); 2) providing consumers with limited information on the products they buy; 3) manipulation of the supermarket environment; 4) emphasizing processed and convenience foods - which demand less skill of shoppers and eaters - over less processed ones.

According to dominant theory, markets are effective when consumers purchase rationally. In order to act rationally, they need all the relevant information. Having all the relevant information allows the market to send clear signals to buyers and sellers. But the food industry and regulators have focussed primarily on price, quality and convenience<sup>105</sup>, and these dimensions have been fairly narrowly defined. For example, food quality has been largely reduced to the safety of the product and, particularly with fresh foods, its cosmetic appearance. Nutritional value, and how its might have been affected by agricultural, storage and distribution practices have not been seen as relevant to consumers<sup>106</sup>. The evidence increasingly suggests that consumers have concerns beyond price, quality and convenience, which can include the social, environmental and health impacts of food production and distribution<sup>107</sup>. The market place, however, rarely provides broader information on social, environmental and health impacts of food production, processing and distribution. This absence of full information helps to create a food marketplace in which partial and contradictory signals are sent to both producers and consumers. These skewed signals, in turn, mean that resources are improperly allocated, to the detriment - according to theory - of buyers, sellers and society at large. These signals reinforce the dominant view that consumers are satisfied by the limited information they receive<sup>108</sup>. Governments have done little to correct this market failure.

The supermarket is the main place through which consumers interact with the food industry. Consequently, the retail sector devotes considerable energy to studying how consumers make purchasing decisions, and designs store layouts and merchandising strategies to encourage them to purchase as much as possible<sup>109</sup>. Food skills are compromised by the myth of choice. Many foods are “copycats”, products which differ in only minor ways from each other. Many brands are controlled by the same firm, but the average consumer has no way of knowing this. People believe they are exercising choice when they shop but these choices are actually illusory. As well, 70% of purchases are impulse buys (unplanned purchases). The retail industry exerts considerable effort encouraging this, because most of the impulse buys are more convenience and higher profit margin items. The way products are positioned in the store - on the shelf, and by the check out counter - is central to this.

Industry does not make much money by selling raw or minimally processed commodities. Profits come from so called “value-added” products. Frequently, the less raw food in the

product, the more profit can be made. The more convenient the product is for the eater, the more money can be made. Consequently, a highly skilled cook, working from basic ingredients, offers less profitability to most firms, creating a built-in incentive to ensure that cooking skills, or time to cook, are lost.

#### Current government view of problem and activities

Some municipal and provincial governments, through their public health units, have moved to counter the de-skilling trend. However, budgets allocated for this purpose are small, especially in the face of the forces contributing to de-skilling. The federal government has neither invested significantly in reskilling, nor acted to curtail forces contributing to de-skilling.

#### Key barriers to change

Corporations do little to support skill development. It can be argued that current approaches to government regulation are also "de-skilling" and "taking responsibility away from consumers". Other than protection regarding food contamination and fortification, the responsibility for nutritional health is seen to be that of the individual. Market forces, advertising and "freedom" and "choice" are the guiding premises. To date, there is no policy or practice that reflects a belief that nutritional health is more important than the freedom of the food system, and the freedom of the individual consumer within the market. The willingness of governments to intervene in areas such as smoking and alcohol consumption behaviour is distinctly different. It appears that government policy does not address "skill development" within individuals, nor impose any nutrition standards for the food system.

#### Solutions that are not receiving suitable attention

A major overhaul of systems for informing consumers about food - labels, advertising, grading, point of purchase information - could have a significant positive impact on reskilling. One recent example of the power of consumer information can be found in food company reactions to new requirements for trans fat labelling. Previously hidden from consumer view, the introduction of trans fat labelling is driving many manufacturers to eliminate trans fats from their products so that they can report no trans fats on the product label. Outside of modest improvements in nutrition labelling that are currently being implemented, governments have yet to seize on opportunities for information beyond safety, nutritional value and price to generate change<sup>110</sup>.

#### **Rating**

Seriousness of Problem: Moderately high, because the implications for health status and demands on our health care system are significant.

Potential for significant improvement with suitable investments: 4

The potential is high, but industry opposition will be significant.

## **5. Farming systems that solve multiple policy problems: Organic farming<sup>111</sup>**

Farming systems that are consistent with agroecological theory have the following characteristics. They tend to reduce or avoid the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. These substances are usually rejected on the basis of their dependence on non-renewable resources, potential for environmental disruption, and possible adverse impacts on soil organisms, wildlife, livestock and human health. Sustainable agriculture systems rely more on crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, appropriate mechanical cultivation or minimal tillage to optimize soil biological and natural pest control activity, and thereby maintain soil fertility and crop productivity. In addition, resistant varieties, and biological, biorational, and cultural controls are used to manage pests, weeds and diseases. Preventative health care strategies, such as dietary changes, increased exercise, and housing changes are employed to maintain animal health<sup>112</sup>.

The best known, but certainly not the only, example of these systems is organic farming. This section focusses on organic farming, not because it is the ultimate expression of agroecological theory, but because it has the most widespread global adoption, the highest public visibility and the most data collected on its performance. Although currently only about 1% of the market, organic foods are the only significant growth area in Canadian food retailing, with estimates of 15-25% annual growth in sales<sup>113</sup>

Although the evidence of organic farming's benefits relative to conventional agriculture is not definitive in each area, there is enough to warrant much greater investments in it than are currently witnessed in Canada. Quick summaries of some of the evidence of benefits are provided here.

### Reduced soil degradation

Since the mid-80s, it has been well-established that organic farming systems can significantly reduce soil erosion relative to conventional operations<sup>114</sup>, with semi-arid regions being a possible exception given current challenges to control weeds and generate sufficient residue for soil cover<sup>115</sup>. Reductions in soil degradation are associated primarily with more complex crop rotations and greater soil cover.

### Lower greenhouse gas emissions

From a systems perspective, organic farming should lead to reductions in emissions and meets the IPCC's criteria for success. Relative to most conventional farm operations, organic farming reduces soil erosion, stores more carbon, does not require synthetic nitrogen and pesticides (and their associated emissions), eliminates nitrous oxide (N<sub>2</sub>O) emissions from non-biological sources, does not permit anaerobic digestion of manure (and the associated methane emissions), often has lower animal stocking rates which contribute generally to lower methane emissions, consumes less energy and water overall, and has higher percentages of farm acreage in perennial

crops (including pasture) and shelterbelts<sup>116</sup>. There is now some empirical research on organic farming systems that demonstrates greenhouse gas emission reductions, greater adaptive capacity in the face of climate variability and significant carbon sequestration potential<sup>117</sup>.

### Greater biodiversity conservation

A review of 33 comparative studies of organic and conventional farming systems found that the organic farming system led to biodiversity improvements for most of the studied organisms. Results were particularly positive for birds, flora and some arthropods. Some negative results were reported for beetles, earthworms and some flora. The authors also categorized the biodiversity benefits of practices that are part of (though not always unique to) organic farming. Of the 10 parameters discussed, 7 had positive impacts, 2 were mixed and 1 (mechanical tillage) was negative<sup>118</sup>.

### Reduced financial pressures on farmers

That organic agriculture systems are usually more profitable than conventional farming systems is not widely appreciated by policy makers. This result is a product of yields, input costs, and price premiums.

Regarding yields, in organic systems, from worldwide evaluations<sup>119</sup>:

- Plant yields are on average 10% below conventional systems. Global averages do vary between extensive and intensive systems because the conventional comparator is different. In North America, crop yields generally range from 20% less to slightly more. In Europe they can be 20-40% less, except in forages where the range is more like 0-30%<sup>120</sup>. Yields in organic systems continue to rise as understanding of them grows and as more money is devoted to research. These increases are not always as great as those under some conventional systems, but occur at much lower environmental costs<sup>121</sup>.
- For animal product yields are on average 20% below conventional, with the same caveats regarding comparisons. But for animal systems, such comparison are even more difficult than plant systems. For ruminants, yields per animal are roughly equivalent, but since stocking rates are generally lower, output per hectare is usually lower in organic systems. The exception is when comparing dairy and beef systems where concentrate feeding is dominant from early in the animal's life. There is limited data on chicken and swine systems, and comparison are even more difficult because of the way these animals are integrated into the farm systems, but yields per animal are generally significantly lower<sup>122</sup>.
- Gross margins are at least as good, if not better than, systems under conventional regimes. In more extensive systems (as in Canada), input cost reductions are often sufficient to maintain gross margins, whereas in more intensive production systems such as are found in Europe, premiums are often required to offset yield declines<sup>123</sup>. Three factors usually account for positive income results in organic systems:

- Operating costs may be up to one third lower, particularly for energy, chemicals, and drugs. Variable input costs are 50-60% lower for cereals and grain legumes, 10-20% lower for potatoes and horticultural crops, and 20-25% lower for dairy cows.
- Where premium prices are available, the likelihood of a superior net income situation is even greater.
- Many organic farmers achieve higher net income by making more direct links with consumers which allows them to capture a greater percentage of the consumer dollar<sup>124</sup>.

### Decreased need for government payments

Organic farming systems are at least as, if not more, profitable than conventional systems as well as less vulnerable to climate variability<sup>125</sup>. In general, they have a greater capacity to resist both wet and dry conditions. As well, these systems tend to be more diverse, providing more revenue streams. Reduced yields or revenues in one crop/animal/product are less likely to penalize the operation as dramatically as in systems where financial health is dependent on a limited number of crops or animals. Overall, these farming systems are less likely than many conventional farms to suffer yield and revenue losses that would trigger safety net payments<sup>126</sup>.

The investigations attempting to analyse the impact of a major shift to organic agriculture have been methodologically controversial, underscoring the need for more study in this area<sup>127</sup>. However, existing studies have concluded that significant benefits would result from the shift, including lower government subsidy payments and crop storage costs<sup>128</sup>. European governments have drawn related conclusions – that supporting the conversion to organic agriculture significantly reduces their public farm program expenditures<sup>129</sup>.

### Rural community revitalization

A variety of studies suggests that sustainable agriculture<sup>130</sup> can contribute significantly to rural vitality<sup>131</sup>. A Nebraska study of an agriculture-dependent community concluded that if more farms were following sustainable practices, total family income would more than double, compared to a scenario where all the farms remained in conventional practices. The property tax base would be larger. More would be spent on supplies, utilities, feed, veterinary expenses, charity, food and personal care products<sup>132</sup>. Less, however, would be spent on agrichemicals, fuel, hired labour, livestock purchased for resale, seed, taxes and interest.

A study of four communities in the U.S. Midwest found those with more sustainable agriculture practitioners had a greater capacity to mobilize community resources for local development, including more active participation in local government, the creation of new community economic development structures and new businesses. This result was attributed, in part, to the problem solving and self-reliance skills of sustainable agriculture practitioners<sup>133</sup>. Compared to their conventional counterparts, organic farmers are generally younger, have higher education levels, and are generally more open to change<sup>134</sup>, which may also partly account for this result.

### Increased food safety and consumer confidence

Organic farming and food processing standards<sup>135</sup> do not permit a number of products and practices perceived to be risky by many consumers, including synthetic pesticides, raw manure, antibiotics and hormones, feeding of animal protein to ruminants, synthetic food additives, irradiation and genetically engineered plants, animals and additives. Levels of pesticide residues in organic foods are consistently lower<sup>136</sup>, and some bacterial contaminants like E.coli 0157:H7<sup>137</sup> and mycotoxin levels in animal feeds may be lower<sup>138</sup>.

### Improved nutritional value of food

For at least 80 years, scientists have known that soil conditions affect some nutritional parameters of foods<sup>139</sup>. Because organic farmers employ fundamentally different soil management practices compared to conventional farmers, the question has been raised whether organic foods may have a more optimal nutritional profile than conventional foods, in particular those constituents that exist in smaller quantities and may have more subtle impacts on health than deficiencies of protein and carbohydrates. Although some argue it is an irrelevant consideration given the amount of food available to Canadians, data from historic nutrient files in Canada, the U.S. and the UK suggest that levels of some micronutrients have fallen significantly over the past 50 years<sup>140</sup>. Given that over half the Canadian population likely does not follow Health Canada's Healthy Eating Guidelines<sup>141</sup>, and some 8% of Canadians report being deprived sporadically of sufficient food due largely to poverty<sup>142</sup>, it is possible that such nutrient losses could have an impact on health.

Results of studies looking at organic vs. conventional plant foods are highly variable. Review studies, where authors have examined a wide range of results, have been divided in their opinions, some concluding that differences are minimal or non-existent<sup>143</sup>, others determining that organic is superior in a number of constituents<sup>144</sup>. The most consistent (but not definitive) results pertain to lower quantity but higher quality grain protein, and lower nitrate and higher vitamin C levels in many organic foods<sup>145</sup>. A bit more consistency is found in studies where test animals are fed an organic vs. conventional diet. In these studies, the researchers look at larger indicators - the health and fertility status of the animal - as indicators of its overall health. In these studies, animals on an organic diet tend to perform better in fertility and infant morbidity parameters than those on a conventional diet<sup>146</sup>.

Organic farming is not a panacea. Certain problems come with it, many of these related to the lack of research to solve structural problems. On balance, though, organic farming appears to offer tremendous opportunities to solve multiple policy problems, but few in government have sufficiently studied its merits to appreciate these opportunities.

## **6. Recommendations for possible NRTEE work**

In general, it can be said that agriculture suffers for a lack of sustainability advocates. Given the NRTEE's experience in the field of sustainability and multistakeholder consultation, there are opportunities to add significant value to work already underway and to create new areas of inquiry and action. This section provides ideas on possible areas where the NRTEE could make a contribution.

The recommendations are sorted into three categories with timing implications.

### **CATEGORY 1: SHORT AND MEDIUM TERM**

#### **6.1 Reform of the Agricultural Policy Framework (APF)**

Canada's new Agricultural Policy Framework is in part a response to some of the problems highlighted above. It attempts to integrate five previously separated areas of agricultural policy - farm financial safety nets, environment, food safety, innovation (including genetic engineering) and rural renewal. Not all areas of the new APF are central to the NRTEE's mandate, so this section focusses on opportunities that are.

##### **6.1.1 Supporting program changes in the APF environment pillar, including support for ecological farming**

On the environmental front, governments have set targets that must be met within a five year period (by 2008). The targets are modest in scope and the programs currently being put into place will only generate these improvements with significant levels of farmer uptake, a situation that is not assured by current supports available to producers. Moreover, it is not clear that they will be able to measure whatever improvements will be readily measurable and their connections to programming apparent. This stands in contrast to the targeted and well supported programs in Europe and the U.S. that are attempting to accelerate the adoption of environmentally friendly farming practices. By the end of the five year APF cycle, Canada will likely lie further behind the U.S. and EU than it does today.

**Recommendation:** The key need here is to help AAFC design and implement environmental programs that will meet the targets set out. Some farm organizations (e.g., Canadian Federation of Agriculture, and the Canadian Horticultural Council) and ENGOs (e.g., World Wildlife Fund, Ducks Unlimited) have taken on this challenge but need more partners and resources if they are to have an impact. AAFC is cognizant of the criticisms levelled against its environmental program. Many staff appear to have similar reservations and have found provincial governments and some farm organizations to be holding back development of more innovative approaches. Some federal staff are beginning to look for new ideas to insert into the next round of APF negotiations that will lead to a new agreement in 2008.

### **6.1.2 Supporting program changes in the APF rural renewal pillar**

Similarly, programming in the rural renewal pillar appears to be weakly developed at this point, and much of it has yet to be announced. Program staff do not appear to appreciate the opportunities for synergies between environmental and rural renewal program (e.g., incorporating environmental systems skills building into the emerging Canadian Agricultural Skills Services [CASS] program).

**Recommendation:** Rural renewal appears to be an under-resourced area within AAFC and a sustainability framework appears not be central to their program design. Innovative ideas on rural renewal programming could have an impact on negotiations for APF2 in 2008.

### **6.1.3 Exploring opportunities to integrate farm financial safety net and environment programming**

Debates over the new APF centre on the merits of the new financial safety net system. While AAFC sees the changes as improvements, the farm sector is largely sceptical, believing that the new system does not have sufficient flexibility in design and will not have sufficient dollars to accommodate the economic and climatic forces buffeting farmers. Both sides are duelling with modelling studies that support each position. AAFC has always been interested in examining how financial instruments could reduce financial, environmental and food safety risks all at the same time. The farm organizations, understandably given their concern about financial health, have balked at this kind of inquiry.

**Recommendation:** Using a sustainability framework, research is needed on possible financial instruments that can help reduce multiple financial, environmental and food safety risks, while addressing farm concerns about a properly resourced financial safety net. For example, some private and public bodies have experimented with insurance instruments to cover losses during the transition to new environmental practices and systems. The basic concept is to cover yield and revenue losses beyond a reference level when these losses are associated with the transition period. U.S. agencies are currently experimenting with a insurance program that covers losses associated with fertilizer reductions as part of nutrient management planning. In pilots, this approach has proven so popular with some watershed protection agencies that they are prepared to pay the farmers' insurance premiums themselves. There have also been U.S. proposals, unsuccessful to date, to implement IPM insurance based on a similar model. Several jurisdictions, including PEI in the late 80s and early 90s, have also examined transition insurance for organic production.

### **6.1.4 Encouraging the APF “brand Canadian food” initiative**

As part of APF implementation, AAFC is exploring ways to brand Canadian food as the most environmental friendly and safest amongst global traders. This is a challenging assignment and AAFC staff (and the agrifood sector generally) are struggling to identify how to proceed. The complexities include whether to brand generically, by product or by process; whether to devise a

new system or help farmers and companies participate in existing schemes; whether sufficient data exists to establish national thresholds for good environmental performance; and how to efficiently carry out standard setting, inspection, certification, accreditation and traceability if new systems must be created. Ultimately, there are significant questions about who captures value from such an effort and who pays the price of its implementation.

**Recommendation:** AAFC and the farm sector do not agree on how a branding initiative might be developed. A third party may have an interesting opportunity to determine the future of this initiative by providing well reasoned and detailed options on how branding could be structured.

## **6.2 Rebuilding Regional Food Markets**

As discussed above, globalization has spawned interest among many food system actors in re-localization of food systems. The hurdles are significant, since distribution channels have been reoriented over the past 30 years to large centres. Consequently, regions experience bizarre patterns of food movement. For example, fruit growers in the Niagara region send their product to Toronto's Food Terminal, only to have Niagara food service providers buy it and transport it back to Niagara. A marketplace, whether real or virtual, is not currently in place to facilitate exchange within the region. Apple growers in one growing region of Quebec ship varieties to another apple growing region and that region sends the same varieties of the same quality back. There is no economic advantage to this pattern of exchange, just the convenient relationships built up during the past few decades. Organic milk producers in Ontario ship milk to the Maritimes, despite the significant transportation markups. There are organic producers in those regions, but the milk marketing boards do not permit separate pooling of organic milk, so local farmers can not supply local markets even though they could do it at lower cost.

**Recommendation:** At this point, regional food flows have been poorly researched in Canada. The economic and environmental implications of failing to optimize regional food markets have not been well explored. Consequently, strategies for rebuilding such markets are poorly articulated. NGOs and municipal food policy councils do not have the resources to properly research food flows and government departments of agriculture are unlikely to take on this task given commitments to globalization.

## **6.3 Supporting Expansion of Organic Farming and Food Distribution**

The organic sector has developed a National Organic Strategic Plan, outlining 33 strategic actions to advance development of the sector<sup>147</sup>. These actions address issues of policy, programming, research and extension, market development and institutional capacity building. The organic sector, however, is significantly under-resourced and lacking the intellectual and financial capacity to implement many of the measures.

**Recommendation:** The NRTEE could examine the National Organic Strategic Plan to identify strategic actions to which it might contribute.

## **CATEGORY 2: MEDIUM TERM**

### **6.4 Changing Problematic Central Features of the Food Regulatory System**

Key to environmental and food safety assessments at the federal regulatory level is the use of a particular construction of scientific assessment of risk, and a risk-based allocation of resources. This approach has generated intense debates about desired levels of protection and the appropriateness of different control measures, the scientific bases for risk decisions, public expectations, and relative costs and benefits of intervention. In the view of many, the chosen approach limits the assessment process, with negative implications for improving the environment and food safety. A related problem is that regulators, in their focus on a particular construction of risk management, are failing to reduce or eliminate the generation of hazards. For the review of new food products and processes, many are advocating for incorporation of a progressive conception of precaution and assessment of societal benefit, but detailed proposals on how this would be accomplished are lacking.

**Recommendation:** A well elaborated proposal on how to incorporate the precautionary principle into food and agriculture regulation could significantly mobilize advocates for change, and soften regulatory opposition. Some preliminary work has been done by NGOs, including World Wildlife Fund and the Canadian Environmental Law Association on pesticide regulation, Pollution Probe on a variety of subjects including food safety, and the Canadian Institute for Environmental Law and Policy and Greenpeace on genetic engineering in the food and agriculture system. Similarly, other jurisdictions have implemented elements of societal benefit assessment but Canadian regulators continue to claim such assessments are insufficiently developed to be useful. A review of assessment methods used in other jurisdictions, with advice on how to apply them in the Canadian context, would be a very useful contribution to this discussion.

### **6.5 Exploring Payments for Environmental Services to Stabilize Farm Incomes and Generate Environmental Improvements**

The off-farm benefits of mitigating pollution far exceed the on-farm costs of implementing improvements<sup>148</sup>. The implication is that those benefiting from the mitigation, i.e., society at large, should pay at least some of the on-farm costs of conservation. Some Canadian farm organizations<sup>149</sup> and at least one province (PEI) are now examining payments for environmental stewardship to improve environmental performance and farm finances, inspired by supports currently provided to farmers in the EU. With this approach, farmers receive payments for providing environmental and rural amenity services when they adopt new measures and systems that protect the environment, including organic farming and IPM<sup>150</sup>. Such payments are considered "green box" under the WTO because they are decoupled from production. Based on experiences in other jurisdictions, paying farmers to deliver environmental services (complemented with supporting policy and program instruments) in the course of producing food

could potentially deepen implementation of environmental practices and systems, contribute to financial stability by providing some rewards that the marketplace currently does not provide, and have low net costs to government. Canadian governments have been reluctant to entertain such measures because they do not believe public support for such investments exists, they maybe misinterpreting the costs, and they haven't seen, until recently, receptivity from farm organizations.

**Recommendation:** The Organic Agriculture Centre of Canada at Nova Scotia Agricultural College has submitted a funding proposal to the federal government to discuss the merits of this alternate financing mechanisms amongst stakeholders and to do some modelling work on different scenarios associated with its adoption. This application may not be successful, and regardless, more organizations are need to provide intellectual and financial resources to this discussion.

## **6.6 Creating a National Food Policy**

Canada does not currently have a national food policy. The federal and provincial governments have extensive agricultural policy, some nutrition policy and programming, and social and economic policy that has a significant impact on food security. However, these policy domains are largely disconnected. A brief period in the 1970s saw such a food policy considered but this multidepartmental initiative ultimately failed due to opposition from the Department of Agriculture<sup>151</sup>. Since the 1970s, there have been no serious attempts to constitute a joined up food policy. Interestingly, in the absence of a national food policy, several municipalities (including Toronto and Saskatoon) have created food charters to guide their policy making and program implementation. A joined up food policy would integrate goals related to sustainable agriculture (including organic farming), health promotion, employment, rural renewal, poverty alleviation, and food skills development.

**Recommendation:** The time is opportune for a new initiative to generate a national food policy. Given the experience of the 1970s, it cannot likely be led successfully by AAFC. A body like the NRTEE might be well placed to lead a multistakeholder consultation.

## **6.7 Facilitating Development of Food Citizens**

Because food is so central to life, it is argued that everyone has a stake in the way the food and agriculture system is organized. People should not so much be food consumers as food citizens<sup>152</sup>. The concept of “consumer” defines a person’s interests and power primarily by his/her ability to buy (or reject) products and services. The language of “citizen” implies some complex membership in a society, with both rights and responsibilities. Citizens have capacities (rights and responsibilities) beyond those of consuming goods and services. Similarly, society is more than simply a marketplace.

**Recommendation:** The concept of food citizenship is poorly explored in Canada. Dr. Tim Lang in the UK is one of the pioneers of this concept<sup>153</sup> and some jurisdictions in other parts of the world have implemented some interesting measures<sup>154</sup>. A full exploration of the merits of food citizenship and its implementation in Canada (including public education and consumer information rules) would significantly advance discussion of this concept and measures to bring it to life.

## **6.8 Beyond Supermarkets: Diversifying Mechanisms for Acquiring a Nourishing Diet**

Across the country, NGOs concerned about food security are engaged in projects that attempt to take food distribution out of the supermarkets and into community and public spaces. School food programs, community kitchens, popular restaurants, food box delivery schemes, food markets in social housing complexes, and farmers markets are just some of the projects underway. Many have been quite successful at increasing access to an affordable and nourishing diet for small numbers of people. The challenge is to expand these initiatives, but significantly roadblocks are in the way, including the lack of recognition by policy makers of their significance, difficulties creating NGO - private sector - institutional partnerships to support them, long-term financing, and in some cases institutional policy and structural design barriers (e.g., schools constructed without proper kitchen facilitators, building lobbies that can't accommodate a market space).

**Recommendation:** The NGO sector is in need of a strategic plan to advance its programming efforts. There is an emerging national network of these organizations, facilitated in part by Ryerson University's Centre for Studies in Food Security<sup>155</sup>. Lacking a coordinated plan in this area, member organizations struggle to be effective and to have a significant impact on policy, and institutional and private sector actors.

## **CATEGORY 3: LONG-TERM**

### **6.9 Redesign of Pricing, Trade and Governance**

#### **6.9.1 Proper food pricing - internalizing external costs**

In industrial countries, food prices do not reflect their real costs, with the environment and human health absorbing unpaid costs externalized by food producers, processors and retailers. In that sense, cheap food is an illusory concept and such a situation cannot continue indefinitely because of the burden imposed on natural and human resources. If such costs are internalized, how they affect retail food prices for those on limited budgets is not well understood. Would higher prices associated with cost internalization be neutralized by lower prices associated with new competitiveness initiatives to counter the impacts of corporate concentration?

Interestingly, theoretical arguments have been articulated on how organic farming internalizes external costs<sup>156</sup>. Empirical work, however, is limited.

**Recommendation:** Significant Canadian work is required on consumer level impacts of cost internalization in the food and agriculture system. There are a number of studies articulating the billions of dollars in externalized costs of conventional food production and distribution<sup>157</sup>. Only a few have attempted to relate these costs to consumer food prices. Unpublished work by Jules Pretty indicates that the externalized costs of greenhouse gas emissions are in the order of 200 fold higher for a conventional UK meal imported from various global locations, compared with an organic meal sourced within 50 miles of where it is consumed. The study concludes, "When externalities are included, the cost in Britain of an individual's weekly food basket rises by 3% if organic-locally sourced, and rises by 16.3% if conventional-global"<sup>158</sup>.

#### **6.9.2 Transforming trade - building self-reliance**

"A healthy economy will be a relatively self-sufficient one. A community's complete dependence on outsiders for its mere survival weakens it...the most fundamental requirement for survival is food. Hence how and where food is grown is foundational to an economics for community."<sup>159</sup>

As discussed above, Canada has drifted away from earlier positions of relative self-reliance. To date, only five significant studies have addressed the potential for food self-reliance in Canada<sup>160</sup>. All have concluded that Canada would need to make substantial changes to agricultural land use to ensure a sustainable agriculture scenario, highlighting in particular imbalances in animal vs. crop production and the need for significant investments in the fruit and vegetable sectors. The most comprehensive Canadian work<sup>161</sup> examined, in a dynamic fashion, changes in Canadian demographics to the year 2031, desirable health promoting changes in the Canadian diet, and sustainable food production systems. The assessment revealed self-reliance potentials both nationally and regionally. Overall, Canada would continue to export grains,

pulses, oilseeds and potatoes, but at lower levels than currently. Due to changing dietary patterns, the domestic needs for animal products could be met, but some importation of fodder crops would be required. Deficits would still exist for vegetables, fruits, and apples, but at lower levels than currently. Little work has been done on this subject since the late 80s.

***Recommendation:*** Building on these earlier studies, a full assessment of Canada's potential for food self-reliance, and the environmental and economic implications of different paths, is required.

### **6.9.3 Broadening governance of the food and agriculture system**

Departments of agriculture typically do not have a comprehensive, overarching policy framework in which more specific proposals are evaluated. Instead, departments generally allow the market place to determine overall direction and to define what is valuable and desirable for society, and only intervene to attempt to mitigate the negative impacts of the market<sup>162</sup>. When combined with the dilemmas of governing from the centre (described in section 3), there is usually no mechanism to bring large issues about agricultural development to public debate. The government's review frameworks focus on the specific dimensions of a technology or process, and no units take responsibility for the macro-policy questions that might confront the traditional reliance on the market to solve problems.

***Recommendation:*** There is a pressing need to present new models for governance of the food and agriculture system at a national level. Municipal food policy councils are a viable local mechanism for new governance and some preliminary work on reorganizing the federal AAFC has been carried out by the Toronto Food Policy Council<sup>163</sup>. Considerably more work is required.

## **Appendix 1: Jurisdictional Roles and Responsibilities**

<b>Area</b>	<b>Federal role</b>	<b>Provincial role</b>	<b>Municipal role</b>	<b>Main federal policy / legislation</b>	<b>Areas for which no level takes significant responsibility</b>
Nutrition	Nutrition policy, programming, program funding, some research on nutritional quality of food; occasional surveys	Programme delivery and framing / financing for municipalities; occasional surveys	Program delivery through public health units	No comprehensive food and nutrition policy Food and Drugs Act and Regulations; Consumer Packaging and Labelling Act	Monitoring of aggregate negative impacts on nutritional quality of the food supply
Meat inspection	CFIA responsible for national standards, enforcement in cross-border trade	Responsibility for internal trade, but many use federal rules	Inspect restaurants and some retail & food service	Meat Inspection Act, Food and Drugs Act, Canadian Agricultural Products Act HACCP	Controversy surrounds shift to more industry self-regulation through HACCP

*Food Production and Supply in Canada: Issue Exploration (July 2004)*

Preventing market manipulation and fraud	Competition rules and criminal law provisions and enforcement	Licensing of professions, occupations and establishments; enforcement	Limited licensing and inspection, usually related to restaurants & food service	Competition Act Food and Drugs Act Numerous Criminal Code provisions	Insufficient resources for proper enforcement
Agricultural research	Funding Direct research by extensive network of agricultural scientists	Some funding (particularly of universities) and some direct research on a smaller scale	No direct research except in some cases data related to food safety	AAFC Act; various acts establishing research bodies Matching Investment Initiative	Research that does not result in product commercialization hard to fund because few industry partners
Environmental farm planning	Setting national model Financing 60/40	Adapting program to provincial realities, program delivery (usually 3 <sup>rd</sup> party)	No specific role	Agricultural Policy Framework No specific legislative foundation	Outcome monitoring, comprehensive supports to farmers to adopt new systems and technologies
Water quality monitoring and enforcement	Divided among several federal depts; AAFC role primarily research and monitoring	Some research and monitoring; extension to change practices	May be role through conservation authorities with municipal links	Canada Health Act; Fisheries Act; Oceans Act; Migratory Birds Convention Acts; Canada Water Act; CEPA	Attention mostly on surface waters, less to ground water Battles over enforcement authority

*Food Production and Supply in Canada: Issue Exploration (July 2004)*

<p>Agricultural land protection</p>	<p>Largely monitoring land use change</p>	<p>Lead responsibility, but many provinces do little(except BC, QC, PEI), effectively leaving it to municipalities</p>	<p>Often have big impacts on land loss, can use zoning to protect</p>	<p>No specific federal legislation; some provinces have acts</p>	<p>Major example of how divided authority produces fragmentation and problems</p>
<p>Farm financial safety nets</p>	<p>Various programs. Setting national model, financing 60/40 (excluding farmer contributions), delivery in many provinces</p>	<p>Negotiates model with federal govt, provides 40% of costs, some provinces do delivery</p>	<p>No specific role</p>	<p>Farm Income Protection Act Agricultural Policy Framework</p>	<p>Major battles between federal and provincial governments and farmers over adequacy of coverage and the funding formula, especially for poorer provinces</p>

## **Appendix 2: The conceptual roots of Canada's approach to food production and supply, and an alternate analytical paradigm**

Although moderated somewhat by the environmental problems of the past two decades, Canada's food production and supply system is still primarily based on a productivist model of performance. High outputs, high levels of inputs, capital intensity, and minimal labour have been viewed as the central elements of this approach. The need for high outputs to deal with population growth has frequently been used as the justification for resource exploitation.

This model is founded on historical positivist - reductionist traditions<sup>164</sup> in agriculture science and economics. Western science and economics, including their agricultural expressions, have a long tradition of dividing scientific and economic problems into discrete, manageable pieces, essentially eliminating environmental context from the inquiry. The rise of industrial capitalism created a demand for specific, useable tools for profit making, and scientists and industrialists worked together to create them<sup>165</sup>. As a result, many scientists confined their interests by researching subjects of value to industrial capital. With the successful development of sophisticated tools and technologies, it was easier to adopt the belief that nature could be endlessly managed and manipulated without negative consequences<sup>166</sup>. Commitment to positivist-reductionist approaches was reinforced because most tools and technologies appeared to be dramatically effective within their narrow frame of operation. Powerful tools, however, invariably have multiple harmful side effects as a result of both their use and misuse, although the significance of many of these effects is often not realized until a great deal of damage has been done.

Reductionism remains central to much of agricultural science today and many current problems can be traced to it. Critics of this approach believe that much problem solving is addressing the secondary and tertiary negative effects of the productivist model. For example, most research devoted to reducing manure pollution is necessary because of earlier research and extension efforts that minimized the role of manure in creating soil fertility in favour of synthetic fertilizers. The view of manure as a waste to be managed has now been found to be an error.

In contrast, sustainable agriculture proponents believe that agroecology is a more comprehensive and robust paradigm for understanding problems in the food and agriculture system and potential solutions. Agroecologists attempt to design permanent solutions to environmental problems, ones that do not trigger the types of unanticipated negative consequences that have characterized other types of agricultural problem-solving. Agroecology is concerned with the relationships between organisms, and their associated nutrient, energy and water flows. It is concerned about systems and their dynamics. It is a highly contextual paradigm, believing that all activities occur within a particular environment that must be understood to make sense of specific actions within it. Facts, or units of knowledge, can not be separated from the environmental, socio-cultural, political and economic context in which they are investigated. Agroecology believes in multiple

causes and multiple effects. This is a relatively new science. Although ecology is over 100 years old, agroecology is perhaps a 60 year old discipline, still in many ways on the margins of agricultural science.

Using the agroecological paradigm, four essential system properties of agroecosystems have been determined: productivity (level of output); stability (constancy or persistence of output over time); sustainability (recovery from stress, disruptions); equitability (evenness of distribution among various groups)<sup>167</sup>. Agroecology has identified a number of “laws” of agroecosystem behaviour<sup>168</sup>. These “laws” direct how agroecologists interpret the behaviour of agroecosystems and the strategies they feel will enhance sustainable production. Resolving problems involves mimicking the functions of natural ecosystems<sup>169</sup>. Put another way, employing production practices that a) promote community stability; b) optimise the rate of turnover and recycling of organic matter and nutrients; c) optimise multiple use of the landscape; d) optimise energy flow efficiency, are most likely to ensure sustainability<sup>170</sup>.

Sustainable approaches, consequently, use design and management procedures that work with natural processes to conserve all resources and minimize waste, while maintaining or improving farm profitability. Working with natural soil processes is of particular importance. In this view, sustainable agriculture systems are designed to take maximum advantage of existing soil nutrient and water cycles, energy flows, beneficial soil organisms, and natural pest controls. By capitalizing on existing cycles and flows, environmental damage can be avoided or minimized<sup>171</sup>

There are also social and economic dimensions to this framework. Agroecology intersects conceptually with the related frameworks of ecological economics and social ecology. On a pragmatic level, farming systems consistent with these ecological approaches also aim to ensure the humane treatment of animals, food that is nutritious and uncontaminated with products that might harm human and livestock health, and the well being of rural communities. It is common for practitioners to promote democratic control over the food system, cooperative economic relations, and the mobilization of social capital<sup>172</sup>.

**Endnotes:**

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2 Calculated from food disappearance data, Statistics Canada. 2003. **Food Consumption in Canada, Part I, 2002**. Statistics Canada, Ottawa.

3 Warnock, J. W. 1982. **Reliance on Food Inputs: an analysis of the short and long-term prospects for continued food imports to B.C.**, Dawson Creek: Peace Valley Environmental Association; Warnock, J.W. 1984. Canadian grain and the industrial food system,. **Presentation to Learned Societies Conference**, Guelph, ON, 10 June.

4 Canada has not done a national nutrition survey since 1972, but some provincial report carried out in the 1990s confirm this. See a Toronto report based on Ontario data, McKeown-Eyssen, G. et al. 1993. **Food and Nutrition in Metropolitan Toronto: a descriptive report of nutrition data of the Ontario Health Survey**. North York Community Health Promotion Research Unit, North York, ON.

5 AAFC data, see [http://www.agr.gc.ca/fact\\_e.phtml](http://www.agr.gc.ca/fact_e.phtml)

6 A notable exception to this is the Prairie Farm Rehabilitation Administration (PFRA) which has been involved in program delivery in Western Canada since 1935. PFRA is now being reorganized to offer services nationally as part of APF implementation.

7 The main relevant federal ones are: Food and Drugs Act, Canadian Food Inspection Agency Act (Bill C-60), Canadian Agricultural Products Act, Feeds Act, Fish Inspection Act, Seeds Act, Consumer Packaging and Labelling Act, Plant Protection Act, Plant Breeders Act, Health of Animals Act, Meat Inspection Act, Hazardous Products Act, and the Pest Control Products Act. The provinces and territories also food safety legislation that covers food products that are not registered in the federal system, and provides for oversight of food related facilities that are not generally involved in interprovincial trade (e.g., slaughtering plants that aren't involved in intra provincial or international trade) or serve local markets (e.g., restaurants, food retail stores).

8 A new federal - provincial - territorial framework for working on food safety was put in place in 1996.

9 For an overview, see the CFIA web site, <http://www.cfia-acia.agr.ca/english/index/fssae.shtml>

10 For a summary overview of responsibilities, commodities covered, and pertinent pieces of legislation see Exhibit 25.1 of the **2000 Report of the Auditor General of Canada** (<http://www.oag-bvg.gc.ca/domino/reports.nsf/html/0025xe01.html#0.2.MI3V39.I3SAEI.Z6BY4G.L5>).

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- 17 McRae, T. et al. (eds.). 2000. **Environmental Sustainability of Canadian Agriculture: report of the agri-environmental indicators project**. Agriculture and Agrifood Canada, Ottawa.
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24. Data compiled for the Environment Bureau, Agriculture and Agrifood Canada; A detailed report on ARS global change research appears in the July 1997 issue of ARS' Agricultural Research magazine. The report can also be found on the World Wide Web at: <http://www.ars.usda.gov/is/pr/gcindex0797.htm> .
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- 26 N<sub>2</sub>O emissions (1996) = 120 Ktonnes; CH<sub>4</sub>O emissions (1996) = 1074 Ktonnes

- 27 McRae, T. et al. (eds.). 2000. **Environmental Sustainability of Canadian Agriculture: report of the agri-environmental indicators project**. Agriculture and Agrifood Canada, Ottawa.
- 28 Agriculture and Agrifood Climate Change Table. 2000. Reducing Greenhouse Gas Emissions from Agriculture: Options Paper. National Climate Change Secretariat. **Publication #: 2028/E**
- 29 Agriculture and Agrifood Climate Change Table. 2000. Reducing Greenhouse Gas Emissions from Agriculture: Options Paper. National Climate Change Secretariat. **Publication #: 2028/E**
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- 31 There is an extensive and sometimes contradictory literature on this subject. See, for example, various volumes in **The Canada Country Study: climate impacts and adaptation** (1998). Environment Canada, Ottawa; McCarthy, J.J. et al. 2001. **Climate Change 2001: impacts, adaptation and vulnerability**. IPCC and Cambridge University Press, Cambridge, UK.
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In fact, departments of agriculture in Canada are widely viewed as captives of farm and food industry interests. For more on this topic, see Winson, A. 1992. **The Intimate Commodity**. Garamond Press, Toronto.

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