

AGRICULTURE and the ENVIRONMENT - ANALYSIS and ACTION

(prepared by Helen Forsey for sign-on by Canadian Environmental Network member groups)
February, 2007

Introduction:

Farming is in crisis in Canada. So is the environment. Since agriculture and the environment are intimately intertwined, both crises must be addressed together.

We are all involved in agriculture, through the food we eat, the water we drink, the air we breathe, and the choices we make. And we are all part of the environment, whether we live on farms or in cities, in rural communities or in the industrial heartland.

The twin crises of agriculture and the environment threaten not only our own present-day economy and well-being, but the very survival of our society - the future that our children and grandchildren will inherit. It is our responsibility to look squarely at the problems, understand the causes and potential solutions, and act - now, while the opportunity lasts.

That is the urgency behind this paper.

Canadian Agriculture Today – Environmental Implications

Canadian agriculture today is characterized by ever-larger farms, ever fewer people farming, and record-low net farm incomes. Governments and agribusiness corporations vigorously promote a factory-style agriculture of monocultures and megabarns largely geared to export. This industrial approach demands costly specialized machinery and equipment, intensive application of synthetic chemical inputs (fertilizers, pesticides, pharmaceuticals), and increasing use of genetically modified (GM) crops and livestock. Local markets and industries vanish as farm products are trucked away to centralized processing and distant customers. This model is reinforced off-farm through corporate control of agricultural education and research, and bureaucratized "one-size-fits-all" regulations geared to global commerce.

Separately and together, these trends dramatically affect the natural environment, human and animal health, and the security of our food supply.

At the same time we see expanding public concern about climate change and pollution; recognition of the "peak oil" phenomenon and limits to growth; increased emphasis on responsible stewardship of land and water; a resurgence of interest in organic and low-input agriculture; and a growing realization that in the field of food production, "small is beautiful" and "acting locally" makes sense.

These alternative trends, too, have enormous implications for the environment and for the future of farming in Canada.

This paper complements the *RCEN Green Paper on Agriculture and Environment* (www.cen-rcen.org/eng/caucuses/agriculture/index.html). It outlines key agro-environmental issues, and sets out some directions for positive action. Subject areas have been chosen to reflect major environmental themes and give order to the presentation. But as in ecology itself, the divisions are arbitrary, as all the subjects overlap and influence each other. Policy and action recommendations are integrated throughout the paper, rather than separated out shopping-list style, because the complex inter-connectedness of both the problems and the potential solutions requires an understanding of the overall picture and a correspondingly holistic approach.

Soil – "They're not making any more of it"

Agriculture starts in the soil - that complex, living mix of minerals, organic matter, microorganisms, water and air that supports and nourishes plant life. Those plants in turn feed humans and other animals, and eventually return to nourish the soil itself again.

Fertile soil is a precious resource, non-renewable in the short term and very vulnerable to urban sprawl, erosion, depletion and contamination of various kinds. How we care for it is key to our present and future food security, and affects all other aspects of the agro-environmental balance.

Only a small percentage of Canada's huge land mass is classed as agricultural land, ranging from rough pasture to rich fertile cropland. Most of the best agricultural land is along our southern border, where the growing season is longest and the human population is concentrated. This puts huge pressure on the land and those who farm it. Uniquely productive and accessible farming areas like the Niagara Peninsula, Quebec's Montérégie and BC's lower mainland are being rapidly paved over and built up, while in every province farmland gives way to suburbs, highways, airports, golf courses and industrial parks to meet urban priorities.

Soil is at risk from natural as well as human forces. It takes decades to build up fertile topsoil rich with organic matter, but almost no time for water or wind erosion to take it away. When inappropriate tillage, irrigation, row cropping or herbicide use leave it exposed to the elements, it disappears even faster. In many areas, soil problems are compounded by acid rain from near or distant industries, or by leaching and salinity resulting from irrigation.

Many other mainstream agricultural practices also leave the soil badly damaged. The massive machinery required to cultivate large acreages often causes soil compaction and erosion. Intensive cultivation of high-demand crops like corn depletes the soil of nutrients and the organic matter that maintains soil life and structure. And soil ecosystems simply cannot function under an onslaught of chemical fertilizers, herbicides, insecticides and fungicides.

Synthetic fertilizers cannot maintain the complex, living nature of the soil, even when used in crop rotations with nitrogen-fixing legumes. Nor can soil be properly maintained or rebuilt with manure from intensive livestock operations, or sewage sludge (coily labelled "biosolids") from septic tanks or municipal waste. In fact, using these substances risks further contaminating both soil and water with chemicals, heavy metals and even pathogens.

Many farmers are increasingly aware that agricultural practices must change if soil is to continue to produce food, and to play its part in a healthy environment. Organic farmers are leading the way in rebuilding soil structure and organic matter, stopping soil contamination and demonstrating the benefits of smaller-scale, mixed farming based on intimate knowledge of their land. Many others are reducing their use of chemicals, and drawing on old wisdom and new information about contour tillage, crop rotations, rotational grazing, woodlots, shelter belts, cover crops, mulching, and inter-cropping. These farmers should have the public's full support.

Concerned citizens are working at municipal and regional levels to preserve farmland through rational land use planning, and pressing for provincial and national soil protection policies and enforcement. Many are actively opposing development on specific agricultural lands, keeping in mind the legitimate concerns of farmers for whom sale to a developer may offer the only way out of debt or into retirement. Such activism is complemented by local food initiatives like Community Supported Agriculture (CSAs), food coops and community gardens, and by media and educational work to increase people's understanding of and commitment to the living earth that grows our food.

Water – Agriculture’s Lifeblood

In agriculture, water is as essential as soil. It is vital for both plant and animal life, and is the main component in raw agricultural products. How the quantity and quality of water affect agriculture, and how agriculture affects this crucial element of the Earth’s environment, are thus questions of vital interest to farmers and environmentalists alike.

Only about 9% of Canadian water withdrawals are used for agriculture, compared to 63% for thermal power generation (nuclear, gas and coal). Our showers, baths and flush toilets use almost as much water as our agriculture does. Both uses are largely consumptive; agriculture returns less than 30% of its water to sources that can be used again. Also, the mega-processing plants required by biofuels and other products of industrial agriculture are big water-guzzlers.

Too little water is a classic problem for farmers. So is too much, and both are likely to get worse as climate change progresses. Drought affects most areas at some time, but it is a constant threat in dryland parts of the West, and irrigation is often seen as the answer. In fact, irrigation is Canada’s biggest agricultural user of water. However, it can lead to problems of soil salinity, and to aquifer depletion if water is withdrawn faster than the source can recharge.

Heavy rains or snow melt can also be serious problems, causing erosion and flooding and saturating soils. When cropland is poorly drained, the plants are weak, yields are lower, machinery use is hampered, and chemical or biological contaminants may leach into the water table. Wet weather or flooding turn Intensive Livestock Operations (ILOs) into dangerous major sources of such contaminants, from both manure and deadstock.

Significant amounts of water are also used in dairy and livestock farming, notably for the liquid manure systems used by many ILOs. But again, the main concern is water quality. Even small farms must be vigilant in dealing with manure, washwater, and pasturing near water bodies. The more so in ILOs, where thousands of animals are crowded together in conditions of extreme stress, and fed hormones for growth and antibiotics to discourage rampant disease. Manure from these massive operations becomes a toxic soup of chemicals, sediments, and antibiotic-resistant pathogens that can quickly pollute surface and groundwater, endangering both human health and the whole environment, including the oceans and marine life.

Even before all the bad news about boil-water advisories and global warming, most farmers were doing what they could to conserve and protect water. Practices like buffer zones, proper drainage, reducing chemical inputs, fencing off waterways and composting manure can improve water quality, reduce erosion, and restore wildlife habitat. But such measures can be costly, and with farm incomes at record lows, many farmers simply cannot afford to do more.

On the consumer end of the food chain, we must become water-conscious as well. Lettuce from California and tomatoes from Mexico represent literally tons of imported water, brought to us at huge environmental cost in energy and pollution. To produce them, natural dryland areas have been converted to export agriculture through irrigation from sources like the Colorado River and the Ogallala Aquifer that are rapidly drying up. Buying these products makes us accomplices in water theft, climate change, and undermining local producers and processors.

Water is a public trust, not a commodity, and wise public policy should reflect this. Such policy would include sensible and effective regulations geared to farm size and type, fees payable to the public purse for water withdrawals over a certain amount, and adequate funding for small and medium-sized farms to improve water-related practices.

Hot Air - Energy, Atmosphere and Climate

Farming involves humans in a complex interplay of factors that convert soil, water, air and energy into the agricultural products that we eat and use. Through the magic of photosynthesis, the sun's energy enables plants to literally create biomass, consuming carbon dioxide from the air and returning oxygen. Agriculture uses human and animal energy - and in recent history, fossil fuels - to reliably provide people with that biomass as food and fibre.

As "Third World" farmers and our own grandparents could tell us, it is quite possible to farm without fossil fuels. What is not possible without them is industrial agriculture. Everything from tractors and combines to fertilizers and pesticides, from grain trucks to megabarn ventilation systems to centralized processing plants, run on or are literally made from fossil fuels. Industrial agriculture is using up these non-renewable energy sources at a rapid rate, and churning out air pollution and greenhouse gases in the process. We are busily sawing off the branch we are sitting on.

ILOs are among the worst offenders in terms of air pollution, greenhouse gases and energy consumption. These factory-style operations consume massive quantities of feed which must be produced and transported; storing and spreading their manure emits ammonia, hydrogen sulfide and methane; and trucking their thousands of animals to be slaughtered adds to the problems.

Treating food as a mere commodity for global trade leads inevitably to enormous energy waste and added pollution. Focussing on large-scale production for export, replacing Canadian products with cheap imports, and corporate concentration of processing and distribution means that food now travels a ridiculous 2,500 to 4,000 "food miles" from farm to North American plate. If we go on this way, the advance of climate change and diminishing fossil fuel supplies will render this obscenity - and many others - obsolete.

The dream of avoiding this scenario by using agriculture to produce "renewable energy" is a popular but perilous illusion. The energy needed to grow the crops and process them into ethanol or biodiesel essentially cancels out the energy they produce. Meanwhile, precious land and resources are diverted from growing food. Even if *all* agricultural land in North America were switched to "energy" crops, that would still only meet a small portion of current fuel demand.

In the 1990s, when Cubans suddenly found themselves without oil or trade options, they shifted from a largely industrialized export-oriented monocrop agriculture to a decentralized, diversified, people-based system. Instead of importing agricultural inputs and 60% of their food, they now feed their urban and rural populations with organic food sustainably produced nearby.

Efforts towards low-energy, non-polluting alternatives for Canadian agriculture start with the knowledge, adaptability and resilience of small and medium-sized family farms and the support of surrounding communities. Initiatives like Community-Shared Agriculture, farmers' markets, and "Local Flavour Plus" campaigns are gaining participants and gradually eating into the corporate "World Is Our Garden" approach. Local environmentally-friendly food processing - from abattoirs to dairies, from canneries to solar drying systems - can help make this shift sustainable. Where long distance transportation is necessary, railways are more than twice as energy-efficient as trucking; they should be restored and run at reasonable cost to producers.

Farm woodlots, natural wetlands, and organic soil-building methods help to increase carbon sequestration, wildlife habitat and water conservation. "Human-scale" mixed farms that combine crops and pastured animals can help slow climate change, and are better equipped to respond to its effects. Policy and consumer decisions should move us forward in this direction.

Seeds and Genes - The Stuff of Life

Farmers have always worked with nature to select and develop crops and animals that serve human needs and thrive in particular local conditions. From an almost limitless natural gene pool, humans have cultivated thousands of breeds and varieties to meet widely differing requirements and provide back-up possibilities. As a result, farmers theoretically enjoy a broad range of genetic options, an agricultural gene pool still related to its wild sources and reflecting the immense biodiversity that enables life in the natural world to flourish and cope with change.

In practice, however, biodiversity has been seriously undermined, both on farms and in the wild. Historically, clearing of forests and tilling of prairie destroyed rich and diverse natural habitats. Still, the agro-ecosystems that replaced them were generally fairly diverse themselves, with a variety of crops and animals playing multiple complementary roles. To a large extent that kind of farming, like organic farming today, emulated and worked with nature. In contrast, industrial agriculture tries to pick nature apart and re-engineer it towards uniformity, predictability and the supposed profit of monocultures and megabarns.

Genetic engineering is the culmination of this approach. The manufacturers of fertilizers, pesticides and pharmaceuticals have created the biotechnology or "life sciences" business to convert plant and animal DNA - the very stuff of life - into just another for-profit commodity. With scientific and legal collusion, these companies have acquired patent rights to genetic material, posing a serious threat to the world's gene pool, on which all farming - and life itself - depend.

Patents on genetic material allow company scientists to manipulate DNA in risky commercial experiments to achieve corporate goals. Herbicide-resistant canola brings in profits both from seed and increased herbicide sales. *Bt* (insecticidal) corn grabs market share by promising to solve the corn-borer problem. Many farmers, struggling to break even in the cut-throat world of industrial agriculture, decide to try the genetically modified (GM) seed and submit to the restrictive "Technology Use Agreements" (TUAs) that the companies impose. Some are even being tempted to try growing GM pharmaceuticals and other "novel" industrial products.

The environmental effects of these ventures - even apart from the chemical pollution and human health risks - can be devastating. Genetic contamination from pollen drift has already made organic canola a thing of the past on the Prairies, and is being blamed for the emergence of "superweeds" which, like "Roundup-Ready" crops, are happy with herbicides. Since the whole point of pesticides is to attack the elements of biodiversity known as weeds and insect "pests", designing GM crops to produce or resist these chemicals wreaks havoc with ecosystems. Yet companies and government insist that GM products are "substantially equivalent" to their non-GM counterparts, and therefore need no testing - a claim contradicted by the scientific evidence.

Moreover, as corporate owners of genes focus on their biggest money-makers, potential genetic competitors - farmer-saved or heritage seeds or breeds - face eventual elimination, deliberate or not. Once those are gone, they'll be gone forever, and with them the biological insurance and adaptability - to climate change, for example - that a diverse gene pool provides.

Meanwhile, Canadian farmers and other citizens are carrying on the tradition of organized resistance that got Bovine Growth Hormone banned here and kept GM wheat (so far) from being commercialized. World-wide, many markets are rejecting GM foods, while public pressure (again, so far) keeps the ban in place on "Terminator" technologies (so-called "Genetic Use Restriction Technologies" or "GURTs"). And at the grass roots, more and more people are saving seeds, raising rare breeds, and working to restore the health of fields and woods, rivers and oceans, and life's marvellous and essential diversity.

The Way Forward - Directions for Policy and Action

Concerned farmers and other environmentalists know that farming can be done in ways that benefit the environment while producing food and fibre for human needs. But this can only be done if conditions change so that people can actually make a living by farming this way.

The industrial model of agriculture leads directly to the opposite results. As this paper points out, today's large-scale, capital-intensive, chemical- and biotech-based, factory-style agriculture is harming the soil, water, air, and biodiversity that make up the environment, and undermining the family farms that hold the key to food sovereignty. With climate change escalating and fossil fuels in decline, we must make a rapid shift to a very different approach.

For Canadian agriculture to become ecologically sustainable, we need infrastructure and institutions that support farmers both as food producers and as stewards of land, water air and biodiversity. We need publicly funded, farmer-directed, non-corporate research that honours the Precautionary Principle, and independent agricultural extension and educational systems that promote and assist environmentally friendly farming. We need legal protection for people saving and exchanging seeds, financial and technical support for farmers in transition to organic, and regulations geared to farm type and size so that farmers don't drown in paperwork. We need local processing, storage and distribution, railway branch lines and elevators. We need orderly marketing and supply management systems to give farmers a fair deal and secure our domestic food base, and accessible farm safety net programs to counter bad markets or bad weather.

Farmers should not be forced to choose between good stewardship and economic survival. Yet this choice is being forced upon farm families every day. The more farmers are squeezed by high costs and low prices, the less they are able to resist the promised benefits of using more chemicals, adopting GM crops, or expanding their operations by draining wetlands or buying out their neighbours. Environmental priorities cannot be met until the economics of farming are changed to give small and medium-sized farms a chance.

And, yes - in farming, size matters. When a farm is too big for the farmer to know the peculiarities of each field or to monitor the health of every animal, it can't be farmed sustainably. Ecologically sensitive practices get traded off for the "economies of scale" of massive machinery, chemicals and biotech, antibiotics and liquid manure lagoons. Moreover, when something goes wrong on a big operation, the scale of the environmental damage is correspondingly large.

Governments at every level must reverse their industrial approach to agriculture, withdraw support for globalized agribusiness and focus on reforming and re-localizing our food system. Networks, communities and grass-roots groups like farm or woodlot cooperatives and citizens' organizations can propel this shift. We don't all have to be experts. We just have to know and care enough to make the changes that need to be made.

Environmental NGOs and progressive farm groups are doing excellent research, analysis and policy work on these issues of agriculture and environment - work on which this paper is based. There is a wealth of supporting detail in materials produced by these groups, combining peer-reviewed scientific studies and solid farm-level experience. Examples include the National Farmers Union's briefs on environmental issues, Greenpeace's comprehensive 2005 paper on *Genetically Engineered Crops and Ecologically and Socially Sustainable Agriculture*, *Alternatives Journal's* Volume 32, #3, "Thought for Food", our own *Green Paper on Agriculture and the Environment* (www.cen-rce.org/eng/caucuses/agriculture/index.html), and the websites of Quebec's Union Paysanne, Beyond Factory Farming Coalition, and HogWatch Manitoba, to name just a few. Their recommendations and those throughout this paper deserve the urgent attention of policy-makers and the public.