

Healing the Metabolic Rift Between Farming and Nature: Challenges Facing Organic Farmers

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There is a growing global concern about food security and safety issues generally and the social and environmental impact of particular farming practices specifically. Recently, John Bellamy Foster (2001) reminded us that over a century ago, Karl Marx used the concept “metabolic rift” to describe problems of ecological and social sustainability resulting from capitalist industry and agriculture. People working in the organic sector are currently working to establish an alternative type of farming, a ‘sustainable’ agriculture. Sustainable agriculture is said to emphasize: working with natural processes; and minimizing environmental damage through managing nutrient and water cycles, energy flows, and beneficial soil organisms. There is also an explicit connection made between healthy and safe food supplies and vibrant rural communities. In this paper, I examine the efforts of some members of today’s organic farming movement as they work to address the metabolic rift between farming and nature.

Introduction

Is Canada’s farming system sustainable?

Walk into any major supermarket and at first glance, it would appear that the accomplishments of modern science and agriculture are self evident. Stand near the checkout for awhile towards mid- week when families are renewing their stocks and casually observe shoppers unloading their selected items from their cornucopias carts onto the checkout belt. One might begin to think that a system that can deliver such abundance year around must be stable and secure. On the other hand, watching individuals and families wheel cartload after cartload of groceries out of the store might cause one to contemplate the fragility of our present food system and what would happen if an interruption in the supply of food occurred. One might become even more uneasy as one checks the product labels for the countries of origin and proceeds to uncover the complex set of social and economic network involved with Canada’s food system today.

There is a growing list of scholarly and popular works which, when taken collectively, raise major concerns about industrialized farming and the food system, particularly its impact on the natural environment. In this paper, we begin by summarizing some of the main characteristics of capitalist industrial agriculture and the basis of environmental problems. We then focus on the work of one of industrial agriculture's first critics, Karl Marx, especially with his use of the concept "metabolic rift". We continue by examining current efforts of some organic farmers and appraise the extent to which their practices address the concerns raised by Marx over a century ago. We conclude that while farmers have some control over their on-farm practices, the social relations surrounding farming must also change if the interaction between society and nature is to be less destructive. Our research question can be stated in the following terms: Is there evidence to suggest that sustainable farming practices can actually heal the metabolic rift between farming and nature? If not, what are the social relations which are inhibiting the healing? We pose these questions not to suggest that organic farmers are not attempting to address the unsustainable essence of agriculture nor that one set of farming practices are no better environmentally or socially than others. Rather we want to do two things. First, we want to suggest a theoretical criteria for evaluating sustainability in agriculture and the food system. Second, we want to locate organic food production within a social context, a context that is dominated by capitalist institutions in which industrial farming relations are embedded.

Dominant Features of Modern Agriculture and the Metabolic Rift

Modern agriculture has been researched by a number of social scientists (Clow, 1995, 2001; Cummins, 1995; Doyle, 1985; Goodman and Redclift, 1991; Hay, 1992; Kloppenburg, 1988; Krimisky, 1991; Lawrence, 1990; Mann and Dickinson, 1978; McLaughlin, 1993; Mooney, 1988; Murphy, 1990; OECD, 1992; Sacouman, 1980; Vail et al., 1994; Vogeler, 1981; Wolf and Wood, 1997). Many of their studies describe a system of production and organization which is increasingly similar in character to that found in the industrial manufacturing sector. The main features of this system include:

1. The mounting concentration of assets in the hands of fewer and fewer firms, both in connection with on-farm production and the agricultural input sectors (Goodman and Redclift, 1991: 159; Vail et al., 1994, 57; Wolf and Wood, 1997);
2. Capital, in the form of technology, is replacing human labor and traditional forms of knowledge resulting in a rapid decline in the proportion of the population in industrialized countries directly involved in food production while total food output has increased (Hay, 1992; Vail et al., 1994; Wolf and Wood, 1997);
3. Increasing separation of the manual labor and managerial control as the farm unit grow larger (McLaughlin, 1993; Mooney, 1988; and Vogeler, 1981);
4. Escalating barriers to the entry of young farmers to farming, particularly the financial resources to buy land, machinery, building, livestock, and in some cases quota¹ (Mooney, 1988; and Lawrence, 1990);

¹ In the Grand Falls area of New Brunswick in 2002, land for potato production sold for between \$3,500 and \$4,000. If a person wanted to milk cows, fluid milk quotas in

5. Growing efforts to manipulate nature through the application of science and technology (Cummins, 1995; Doyle, 1985; Goodman and Redclift, 1991; Kloppenburg, 1988; Krimisky, 1991; OECD, 1992); and
6. Reduction in differences in the organization of food production and other sectors of the economy (Clow, 1995; Mann and Dickinson, 1978; Murphy, 1990; Sacouman, 1980; and Wolf and Wood, 1997).

Many critics of the industrialization of farming have been calling for the development of an alternative approach to food production and distribution for both social and environmental reasons (Beus and Dunlap, 1990; Buttel, 1993; Chiappe and Flora, 1998; Clow, 1995; Friedmann, 1993; Gertler, 1992; Hill, 1985; Howard, 1940; Jackson, 1997; MacRae, 1990; Schumacker, 1977; Shiva, 1991; Vail et al., 1994). Clow (2001) argues we can only adequately understand the impact agriculture has on the environment if we recognize that all forms of farming are characterized by human efforts to create and sustain human-arranged eco-systems in the biosphere by using six strategies.

1. Selecting and modifying desired plants and animals from the biosphere;
2. Altering the original eco-systems where we wish to farm;
3. Creating artificial agricultural eco-systems;
4. Artificially and temporarily stimulating the fertility of the farmland;
5. Battling Nature's tendencies to reclaim the farmland;
6. Harvesting minerals and water, in the form of crops or animals, from one area and shipping them off to be consumed and discarded in another area.

Making these strategies of agriculture explicit helps us understand how agriculture impacts negatively on the natural environment and why agriculture is plagued by endemic environmental problems. We then can recognize the ways in which agricultural eco-systems are intrusive on natural eco-systems. As a result of the natural eco-system continually tries to bring back variety and diversity into agricultural eco-systems, agricultural eco-systems are unstable. The productivity of agricultural eco-systems is dependent on the "agricultural input treadmill" because they require ever-greater artificial products and energy to suppress the tendencies of the natural eco-system. The subjugation of the natural eco-system is accomplished at a very high cost including: dependence on industrial inputs, more resistant pests, increasingly toxic bio-cides, loss of biological diversity, and loss of soil fertility resulting from water and wind erosion (Clow, 2001).

December 2002 sold for \$28,078.00 per kilogram butter fat per day (which is approximately equivalent to the production of one cow). Thus, even at a level of what is now considered a small herd of 30 milking cows, it would require an investment of \$843,040.00 just for quota, not to mention land, buildings, machinery, and the cows.

The above model² for understanding the environmental impact of agriculture on the natural environment makes it evident that the primary cause of environmental problems is social. Environmental problems in agriculture result from human efforts to increase production beyond that which Nature can sustain within a specific historical period. Capitalism is the dominant form of social relations of production which characterizes the current historical period. Capitalists have become successful because of their single obsession with economic expansion to accumulate material wealth while ignoring social and environmental impacts of their actions. “Capitalists cannot voluntarily tolerate the increasing costs of resources, the redirection of technological innovations from ‘productivity’ to the reduction of ecological demand, or the constraints on various areas of economic activity the movement towards ecological sustainability requires without abandoning the project which is their defining ‘raison d’etre’ as capitalists” (Clow, 2001: 5).

The Metabolic Rift

John Bellamy Foster (2001) traces criticisms of industrial agriculture all the way back to the work of Karl Marx and the revolution which was happening at the time.³ We share the views of Foster (1999; and 2001) and Burkett (1999) that Marx’s analysis on the environmental consequences of capitalism has not been adequately recognized by today’s social scientists, not even by ecological Marxists. Foster (1999; 2001) offers a summary of the major events in the historical developments and their environmental consequence on which Marx was commenting. First came the process of removing people from the land which resulted in reduced recycling of human organic waste back to the soil and a net loss of soil fertility. The next major event was associated with increased use of mechanical traction and technology to replace animal and human power. The centralization of animal production in feedlots was accompanied by a reduction in the production of forages, particularly legumes, to feed ruminant animals. Furthermore, feedlot operators often did not have an adequate land base on which to dispose of the manure. Because nitrogen fixing legumes were not as widely grown, chemical sources of nitrogen were increasingly used but

² Clow and McLaughlin (2003) refer to this model as the Artificial Productivity Expansion model.

³ Foster (2001: 68-69) notes that, contrary to common believe, there were three revolutions in agriculture which formed the bases for today’s food system. The first occurred over many centuries in Europe and included such factors as the enclosure movement, increasing the importance of relations around village and urban markets. In addition to changes in the relations of production, there were also changes in the means of production and the forces of production. Some peasants and landlords learned the value of crop rotation, manuring, drainage, and livestock husbandry. The second revolution occurred over a much shorter period of time (1830-1880) and was mainly associated with the work of the German agricultural chemist Justus von Liebig and the birth of chemical fertilizers. The third agricultural revolution arrived in the early 20th century and involved the change from animal power to machine traction and the change from intensive to extensive agriculture.

without the providing additional benefits of organic matter or the proper environment for soil micro organisms. With the dependence on firms which provides chemical fertilizers, money flows off-the-farm to company head offices in urban centers and in many cases to other countries.

Marx uses the concept “metabolic rift” to refer to the disruption in the interaction between the social organization of food production and processes of nature. This disruption is the consequence of the removal of soil fertility resulting from shipping food and fiber from one area to another. Modern long-distance transportation has only compounded the rift. The concept of “metabolism”, Foster (2001) explains, was originally used to explain the process through which “an organism...draws upon material and energy from its environment and converts these by way of various metabolic reactions into building blocks of proteins and other compounds necessary for growth” (75). In Marx’s work, the concept is used to describe the patterns of interactions and exchanges between society and nature and therefore take on a socio-ecological meaning.

Marx considers capitalist agriculture unsustainable for basically two reasons. First, there is an antagonism between town and country. The urban population wants, and in some cases demands, that food be as cheap as possible. This is desirable from the stand point of the owners of businesses for whom cheap food means less capital goes to maintaining workers and more can be directed towards manufactured goods and to owners profits. According to Marx and Engels, “the contrast between town and country...has been brought to its extreme point by present-day capitalist society” and, because of the power of urban population, the ecological damage in the rural areas does not lead to “abolish this antithesis, capitalist society on the contrary is compelled to intensify it day by day” (quoted in Burkett, 1999: 119).

Second, in Marx’s view, ecological sustainability is impossible under large-scale capitalist agriculture because it makes impossible the consistent rational application of science to the problems of soil management and the essential cycling of soil nutrients. The division between urban and rural results in both the failure to return soil nutrients to the land and massive build up of industrial and household waste (Foster, 2001: 76). Under the capitalist system of production, people only become interested in soil fertility after its natural qualities have been depleted. Marx writes, “the entire spirit of capitalist production, which is oriented towards the most immediate monetary profit – stands in contradiction to agriculture, which has to concern itself with the whole gamut of permanent conditions of life required by the chain of successive generation” (quoted in Foster, 2001: 77). Understanding what Marx means by large-scale agriculture in relation to the metabolic rift poses a problem for us today. By 1870s standards, even today’s small farms are large. But more importantly, except in the case of subsistence production, small farms are also surrounded by and embedded in capitalist social relations and their products are likely to be shipped to distance markets. It is, however, important to remember that the rift is often greater on farms involving monoculture than in the case of farms that produce crops and livestock and cycle more of the nutrient back to the land.

The metabolic rift is also evident at the international level where the fertility of the soil of colonies and developing nations are transferred to support the industrialization of other countries. Canada has been a provider of staples throughout its history, first to England, then to the United States, and now to other economic centers (Albrow, 2001; Innis, 1933; Marchak, 1983). The result has been a continual flow of goods and nutrients from Canada. Because the process has been going on for the entire history as a nation, many Canadians find it difficult to imagine how an economy could exist otherwise (Laxer, 1988).

One can summarize the general elements of Marx's conception of the metabolic rift in the following manner: The rift between nature and society is the result of disruptions in nature caused by the interaction between the social organization of food production and the processes of nature. Industrial agricultural systems are designed to provide cheap food for the population of industrial centers and the accumulation of capital for owners of the various means of production. The linear movement of nutrients from rural to urban areas degrades soil fertility in the country and adds to the massive build up of household waste in cities. Finding solutions to the rift is made more difficult by the antagonism between town and country and the way large-scale capitalist agriculture inhibits the rational application of science to the problem of soil management.

Co-evolution of Society and Nature

While Foster (1999) and Burkett (1999) offer a systematic reconstruction of some of Marx's work, we focus on the application of one of Marx's ecological insights, the metabolic rift. Understanding the extent to which today's efforts to establish a sustainable agriculture addresses Marx's earlier concerns about the metabolic rift, we must follow food items back from the retail and wholesale outlets, back through the processing and transportation system to the site of actual production; the farm, the practices and social relations which are the foundation of the food system. We are especially interested in discovering the extent to which the people involved with the development of sustainable agriculture are conscious of the metabolic rift and are making specific efforts to address it. Just as Marx's historical-environmental materialist analysis took into account the actual events contributing to the co-evolution of nature and human society, we must examine the actual factors affecting the continued co-evolution in our time. Burkett (1999) stresses the importance of co-evolution in Marx's work. He writes "Marx sees the evolution of humanity as primarily shaped by the changing social forms of production, but he sees these social forms as being themselves reshaped by production as a material process dependent upon natural conditions" (6).

To speak of co-evolution is not intended to imply biological determinism but to acknowledge that in the co-evolution of nature and human society, nature imposes specific conditions on the human being's capacity to manipulate the natural environment using science and technology, the division of labor, and wealth (Foster, 2001: 74). All social forms of production take place within a combination of social and natural environments. As humans increase their scientific and technological power to manipulate nature, human action becomes a more determinant element. The result of the interaction of nature and human society is social change and the production of a new set of natural and social

conditions which becomes the basis for the next round of history making (McLaughlin 2000). Furthermore, the constraints and potential humans experience, and the structure and agency surrounding social change, are specific to a historical period.

Defining Sustainable Agriculture

The term “sustainable agriculture” is currently being used, often loosely, as the goal of farmers, farm organizations, government policies and is even found in agri-business promotional material. We use the term, within the context of this paper, to locate food production within an ecological, economic, and social reality and a duty to act suitably given that reality (MacRae et al., 1993)⁴. Based on this definition, in theory, sustainable agriculture should address many of the issues raised in our earlier discussion of Marx’s work. We have chosen to study the practices of organic farmers as an example of sustainable farming not because their practices are environmentally and socially permanent in any absolute sense but because organic farmers appear ready to reflect critically and continually on the environmental and social consequences of their farming methods. Organic farmers carefully plan their production processes with the goal to manage a diversified, self balancing agricultural eco-system (Clow, 2001).

Method

The following analysis is the result of a re-examination of data first collected by McLaughlin (2000) as part of an ethnographic study of the development of sustainable agriculture in Canada and in Sweden.⁵ We were interested in seeing the extent to which organic farmers’ actions and views are affected by factors similar to the elements of Marx’s metabolic rift and the degree to which organic farmers are working to redress these factors.

⁴ “Sustainable agriculture is both a philosophy and a system of farming. It is rooted in a set of values that reflects an awareness of both ecological and social realities and a commitment to respond appropriately to that awareness. It emphasizes design and management procedures that work with natural processes to conserve all resources and minimize waste and environmental damage while maintaining or improving farm profitability. This is accomplished by taking into account nutrient and water cycles, energy flows, beneficial soil organisms, natural pest controls, and the humane treatment of animals. Such systems also aim to produce food that is nutritious and uncontaminated with products that might harm human and livestock health, and to ensure the well-being of rural communities” (MacRae, Henning, and Hill, 1993).

⁵ Funding for the original data collection was provided through a doctoral fellowship grant from the Social Sciences and Humanities Research Council of Canada, and the Nels Anderson fund at the University of New Brunswick.

Data for both Sweden and Canada were gathered from existing literature, government documents, meetings of organic and conventional farmers, conferences on organic production practices, federal government meetings and as part of an on-farm research group. The primary data are the words and actions of the people interviewed using intensive interviewing techniques. Interviews were guided by open-ended questions using an institutional ethnographic methodology (Smith, 1987) . Questions asked were divided into four general categories: people’s activities, technologies and flows of capital, state policies, and other institutional relations. A total of 45 people were interviewed⁶.

People were chosen to be interviewed because they were considered as having access to valuable firsthand information based on their position in an organization or their farming experiences. In Canada, a list of possible interviewees was generated through personal contacts and snowballing. In Sweden, contact was made through the ecological farmers organization, Ekologiska Lantbrukarna. When practical, farm people were interviewed on their farms. Interviews were conducted between January and December of 1996. Interviews lasted on average, one and one half hours but ranged between one and four hours.

⁶ People interviewed can be divided in the following manner:

Sweden:

Organic Farmers.....	12
Leaders in farmer’s organizations.....	2
Representatives of the Board of Agriculture.....	2
Representatives of a certifying body.....	1
Swedish Academics.....	3
Subtotal.....	20

Canada:

Organic farmers.....	12
Leaders in farmers organizations.....	2
Representatives of governments.....	4
People with certifying bodies.....	2
Canadian academics.....	3
Food or environmental related organizations.....	2
Subtotal.....	25
Total.....	45

Findings and Analysis

In this section we first examine what organic farmers use as indicators of balancing human activities and natural processes. We then shift our attention to the socio-economic context of organic farming. We are especially interested in how capitalism influences the activities of scientists, the state, and consumers and their abilities to support farming practices that could reduce the rift between nature and society.

Water, Nutrients, and Energy Circulation Indicators of Balance

Modern agricultural techniques and technologies have allowed humans to produce local anthropocentric eco-systems. It is increasingly recognized that there is a need for balance. As Horne and McDermott (2001: xii) state “...sustainability dictates that we not tip the balance too far, or we risk destroying the integrity of the Natural system of which we also are part”. Organic farmers’ knowledge about how their farming practices may impact, positively or negatively, on nature requires an effective feedback system. One of the defining features of organic farming is a greater sensitivity to the natural environment. The organic farmers’ interviewed explained that their knowledge about nature emerges from issues of health: soil, plants, animals, and human beings. In their view, the health of the entire food system hinges on the texture, fertility, and biological activities in the soil. Indicators of good soils include reduced diseases in crops and livestock. Lower vet bills are only one advantage associated with improved animal health. Meat that is certified as organic requires the animal to be free of antibiotics for 12 months or more.

Organic farmers describe soil fertility as balancing nutrients and energy flows within the context of the local ecological system. One Swedish dairy farmer stated, “If all the energy [and nutrients] is going to circulate, [then the different aspects of the farm operation] have to fit, the number of animals and farm area.... Finding the balance was difficult because we are not an area that grows a lot of grain.” Other farmers’ comments indicate a sensitivity to the conditions of wildlife on and around the farm, especially earthworms and birds. One vegetable farmer speculated that the increasing numbers of birds he sees on his land is the result of no longer using chemical pesticides as well as introducing winter cover crops into his rotation.

Nearly all the Swedish farm people interviewed made some link between farming practices and human health, particularly allergies in children and increases in the number of cases of antibiotic resistant bacteria. Many Swedish farmers interviewed expressed a general concern about animal welfare. Swedish organic farmers, either because of personal convictions, social pressures or regulations, try to find ethical and humane methods to produce meat and other livestock products.

The Swedish environmental and animal welfare movements, which are influencing farm people’s consciousness about nature, are located in an international terrain. International meetings, like the Rio Conference (1992), Kyoto (1997), and Johannesburg (2002), have

made some farm people more aware of environmental and survival issues. One person explained how the meeting in Rio led to a group being formed in Uppsala (Rio 21). Among the group's projects is one which provides organic food to the schools in the area.

Energy Consumption

Energy consumption in food production is currently receiving greater attention in Canada in light of concerns about global warming and the Kyoto Protocol. Horne and McDermott (2001) assert that, in terms of energy, industrial agriculture is not very efficient. On average, for every unit of food energy produced, 10 units are consumed in its production, processing, and transportation. Debate about the role energy consumption and sources should play in organic food production is only beginning to take place. A summary of a study conducted by the Swedish cooperative Konsum, published in the ecological farmers' publication Ekologiskt lantbruk (3:96), compared locally produced food to that of imported food products on the basis of energy consumption (kilometers traveled) and air emissions. The authors found in general that imported food has a very high environmental impact compared to locally grown organic food. The discussion about the environmental consequences of consumers' choices has stimulated a debate about the use of energy at the farm level. As one Swedish dairy farmer stated "It is hard for me to tell consumers that my milk is ecological if I am not good in terms of energy."

Urban Sewage

Conserving nature and energy on the farm also means recognizing that the movement of food to urban centers involves the flow of nutrient, energy, and water. Efforts are being made in Sweden and in Canada to make the circulation safe and efficient. As of 1996, organic farmers could not apply urban sewage to their land because of concerns about heavy metals, soft plastics, and hormones (particularly estrogen). While organic farmers worry about the contents of the urban sludge, most support the principle of recycling the nutrients. What is lacking is an infrastructure which would provide separation "at source" of the safe from the toxic component and monitor the output. Determining what is safe is no simple task. One Swedish dairy farm recounted an exchange which took place in Tranås in April 1996 where the antagonism between town and country was based on farmers' unwillingness to "take back" urban waste⁷. He states, "They said to the farmers 'will you take it [urban sewage] back?' But we said 'we are not quite sure if it is clean enough.' ...The sludge is a problem for the community and the community wants us to take it back, but we cannot take it back because it is polluted with everything. But the principle is correct."

⁷ The use of the term "take back" is interesting for it reflects an urban view that all the waste comes from rural areas. There would not be a problem for farmers to recycle the soil nutrients. At issue are the industrial contaminants as well as hormones and other medications such as anti-biotic contained in human waste which get dumped into sewage and storm drains. There is also an implicit assumption that the soil and nature is inert and indestructible regardless of what is applied to it and the crops which are grown on these soils will be unaffected.

Marx would no doubt have also approved of the re-circulation. However, urban waste has changed and the indiscriminate recycling of waste could create other problems. During the 1980s, up to 60% of Swedish municipal sewage sludge was spread on agricultural land before the effects had been thoroughly investigated. Following an environmental assessment conducted in the early 1990s, the amount spread dropped to less than ten percent. The decline was due in part to farmers' fears of consumers' reactions to the risk of contamination. By the mid 1990s, public support for waste recycling had increased and more farmers were once again applying sludge to their fields (Vail et al. 1994: 127). However, because standards for organic production are more stringent, organic farmers are still not applying urban sludge to their fields.

Earlier in this paper, we have demonstrated that the epistemological framework for organic farming is based on a particular understanding of, and relationship with, nature –an ecological consciousness which locates human beings within a holistic analysis and in interdependence with the natural environment. Nozick (1992: 76) notes that an ecological consciousness “makes clear that every local initiative is part of a greater world pattern of sustainable development [requiring] cooperation, caring, and ecological sensitivity to other people and nature.” Organic farmers appear to be very aware of the disruptions that farming causes to nature. However, the linear movement of soil nutrients and the build up of urban waste remains an aspect of the metabolic rift that organic farmers have not been able to adequately address. We now turn to the issue of the barriers to the rational use of science under capitalism.

Capitalism, Science and Soil Management Impoverishing the Soil and Workers

Organic agriculture is not developing in a vacuum but rather in a food system dominated by capitalist institutions whose interests coincide with industrial agriculture. Much of Marx's analysis of capitalist agriculture is intended to explain “how large-scale industry and large-scale agriculture combine to impoverish the soil and the worker” (Foster, 2001: 72). During one interview, an employee of a conservation group provided graphic evidences of the importance of soil health and why it is such a major concern. Pointing to a map displaying differences in soil degradation worldwide, she noted that Northwestern New Brunswick was shown as a high risk region as a result of intensive potato production. In Canada, former conventional farmers interviewed explained their reasons of converting to organic as being literally “rooted” in the soil. Land that has been exhausted of nutrients and organic matter is referred to as being “mined out”. Once exhausted, land must be rebuilt through crop rotations and/or the application of soil amenities if it is to regain its vitality.

Focus on Markets

The way capitalist agriculture obstructs the rational application of science to the soil management is, in part, due to the non-monopolistic nature of most conservation practices. Under capitalism, peoples' attention is focused on markets, while activities that are less likely to produce immediate and maximum returns are often neglected. One university

professor who works with organic farmers cautiously explained how capitalism shapes farming practices. “There is a propensity for agribusiness to market products.... Some of the things that have a beneficial effect just don’t seem to make a lot of money. So, it would seem to me that the way the system is set up right now that agribusiness seems to be in conflict with sustainable agriculture for the most part.” One vegetable farm was more direct in his appraisal of the impact of capitalist relations on farming practices. He uses the term “polarization” to describe the divergence between industrial agriculture and sustainable practices. He states “You have...a polarization going on. You have the biotechnology...high tech, the industrial approach, the manipulative approach to agriculture but at the same time, you have real resurgence...in what may broadly be called the organic or sustainable approach.” He then goes on to offer the insight that it is not just farming practices but also the social relations surrounding those practices that influences sustainability. In his words, “The organic movement in as far as it aligns itself with the...large scale production and the wholesale route and the dependence on transportation and technology, it is not really sustainable. So they may have all their certifications lined up and things may look really great but if things are still being mainstreamed and they are still trying to have access to huge markets, then it seems to me they haven’t really thought through the approach to a sustainable food system in a complete way.” His comments reveal tensions and contradictions emanating from within the sustainable agriculture movement. His views are similar to Altieri’s (2000: 88-89) position that organic farmers who focus exclusively on such things as input substitution and production standards while ignoring monoculture and capitalist relations in agriculture will fail to see the structural source of environmental degradation in farming.

Research: Private vs. Public

Private Research

Cuts to public funding for research has produced an opportunity for private companies to increase their influence over the path of agricultural development (Wolf and Wood, 1997). One likely consequence of the products from the labs of multinational corporations will serve to further integrate farmers around the world more completely into an agro-industrial network (Goodman et al., 1987; Vail et al., 1994; Shiva, 1991). Meanwhile, corporations are unlikely to show much interest in areas of research and information that cannot be “commodified.” “Commodification of information refers to data and decision-support systems used in crop production inputs” being “packaged” for sale to farmers (Wolf and Wood, 1997: 187). As Burkett points out, Engels identifies two factors which inhibit the rational application of science under capitalism. First, because of competitive pressure, capitalists are focused on finding answers to immediate questions and not providing a holistic account of ecological interconnections. Second, capitalists see little value in knowledge that cannot contribute to monopolies (Burkett, 1999:161-162). One Ontario farm person interviewed described how he sees agricultural research and technologies, and the resulting farming practices, being tightly interwoven with capitalism. In his words, “The whole ethic of agriculture in North America is designed around this idea that it is not really a useful solution unless somebody is going to buy and sell it, and consequently the whole notion of indigenous knowledge, the wisdom that accumulates from years on the land, is

devalued.” To the extent that researchers are focusing on the market for their work and not on providing solutions to soil problems, they too will not be contributing to the rational application of science to healing the rift.

Public Research

Organic farmers strive to reduce the use of purchased inputs through ecological practices such as natural fertilizers, complex crop rotations, diversified crop and livestock production, and integrated pest management. These kinds of information are not easily “packaged” for sale (Northwest Area Foundation, 1994; The Small Farm Project, 1987). In contrast to the commodified knowledge of the corporations, organic farmers have collectively amassed information, what might be called “common knowledge”, through personal experiences and literature. This information is often exchanged freely and willingly amongst groups of farmers. In spite of its potential benefits, common knowledge receives low levels of private industrial investment because it is associated with “unshielded” practices that are not protected by intellectual property laws (Wolf and Wood, 1997: 193). While the use of unshielded technologies reduces the flow of capital from the farm, it also means that sustainable agriculture is more dependent on publicly funded research if scientific knowledge is to be generated.⁸

At the macro-structural level, in spite of the many social, political, and economic differences historically between Canada and Sweden, the industrialization of farming followed a similar pattern in both countries. However, it should be noted that more of the processing and retailing sectors are under the control of cooperative control and ownership in Sweden.⁹ Political opposition to many of the practices associated with conventional agriculture is much greater in Sweden (ethical treatment of animals, health issues, and the general conservation of nature). This political opposition becomes translated into state support for environmentally sensitive practices by the Swedish state and European Union.

The Role of State

What role can the state play in protecting inter-generational agricultural resources? The state can intervene to increase farm incomes (and thus reduce the need to have immediate returns from soil management practices) or lower prices to consumers or directly assist in land conservation. In most developed countries, agriculture has been granted a special status since the Second World War (Vail et al. 1994). Over the past sixty years, government policy, under the influence of the agro-industrial complex, actively directed the development of this sector of the economy. Some have argued that this involvement stemmed from

⁸ The Organic Agriculture Centre of Canada was founded in 2000 to promote and coordinate research and facilitate farmers transition to organic farming.

⁹ For more details on the differences in the path of development see Laxer, 1988.

concerns about social order (Mohnar and Wu, 1989: 230) while others have stressed the state's role in providing stable conditions for capital accumulation (Panitch, 1977; Basran, 1992). One of the main criticisms of government programs has been its bias in favor of larger or corporate farms (Glenna, 1999; Vogeler, 1981; Mohnar and Wu, 1989) as sources of raw material for value-added processing (Machum, 2001). There is mounting pressure to change the role of states in agriculture (Flora, 1990). This pressure is mainly coming from two very different types of critics: those critical of government funding of industrial farming for environmental reasons and those wanting to liberalize trade and "freeing market forces". In Sweden, organic farmers are considered more politically acceptable for receiving state support because their practices are viewed as a means of moving all of agriculture towards a greater environmental sensitivity and better stewardship of rural landscapes. We could not find evidence of a similar trend in Canada. However, there are some important developments occurring throughout the country. Nevertheless, the state's ability to initiate and institutionalize change is slow and complex compared to the capacity of the consumers at the level of households.

Consumers and Healing the Rift

This brings us to the question of what consumers are doing to direct farming practices towards greater environmental sustainability. Consumer organizations have the potential to wield great power. However, these groups often suffer from a form of "Attention Deficit Disorder" as they appear unable to focus on a single issue for very long (Magdoff et al., 2000). Nonetheless, one Swedish farmer stated that he believes the power for change lies in the hands of consumers. He stated "You provide the information to the consumers and if they say 'we don't want this' there is nothing the state can do. Also the big companies will follow the consumers, they will change their production too."¹⁰ Contrary to what one frequently hears about the tensions between producers and consumers – that producers always ask too much for their product or that consumers are just interested in cheap food – we did not find evidence of strained relations in the case of organic farmers. Although we do not have data on consumer attitudes about organic farmers, the farmers interviewed described how they found consumers to be supportive. One might speculate that this support is due in part to consumers of organic products sharing many of the environmental and health related objectives as organic farmers. We did find that, in the early stage of the development of organic farming, there tends to be more direct contact between farmers and consumers. Consumers either obtain farm products on-the-farm, at farmers' markets (the most common way in Canada), or through consumers' clubs. Although none of the farm people interviewed were participants in Community Supported Agriculture (CSA) groups, a couple of people did suggest that these kinds of groups were effective ways for consumers to remain informed and involved in meeting their food needs. One Ontario farmer described a common complaint about how conventional marketing channels did not allow producers and

¹⁰ The current debate over the legislative labelling of genetically modified foods exemplifies how crucial some companies like Monsanto consider controlling information available to consumers.

consumers to know one another. He stated “Because we are so distanced from the people we service, we are cut off by the process and the people in between. We are robbed of the recognition that should be ours as producers of food.” The reality is, however, the vast majority of farmers are not in close proximity to large urban centers. This means that producers and consumers are going to have to be imaginative and deliberate in finding ways to “know” one another’s situation and needs. One possibility that was suggested during one interview is for the creation of an electronic organic food terminals around which a virtual community might form.

Distances, both the physical and social connections, between producers and consumers have been increasing for some time (Machum, 2001: 72). Much of the conventional food system is now global. Globalization works through the practices of individuals and institutions that transgress national boundaries on a daily basis.¹¹ These interconnections occur commonly at the levels of households, communities, nation-states, and globally. Long distant interactions are made possible primarily by technological changes in communication and transportation.

The concepts “eco-system culture” and “bio-sphere culture” are useful in allowing us to better understand the environmental problems created by global capitalism. Eco-system cultures are cultures where activities are restricted to a specific eco-system. This has two important consequences: Its members have more direct information about the repercussions of their practices; not only are they more apt to see the ecological sense of doing certain things (recycling waste, caring for the soil, and protecting water reserves), they also see that what they do makes a difference, that is their sense of human agency is high. In contrast, bio-sphere cultures distribute its raw materials needs across a number of eco-systems. This has a couple of anti-ecological effects. First, the members of a bio-sphere culture can destroy several eco-systems (the east coast fishery, sections of the Canadian Prairies, or parts of the boreal forest) and still survive. Secondly, causes and effects of their practices are not known directly, rather they must develop their capacity to construct a social analysis which uncovers the reasons for ecological problems and the short and long term consequences. However, because the causes are connected to the actions of large number of people over a vast geographic area, individuals feel powerless to make a difference. Members of a bio-sphere culture experience low levels of human agency and a limited capacity to transform their situation. An organic farm can be seen as an eco-system culture while global capitalism has produced a bio-sphere culture.

¹¹ Globalization has many characteristics, including: Increased mobility of financial and industrial capital; the global divisions of labour and with this has appeared an increasing ignorance about where, how, and by whom goods are produced (what Anthony Giddens [1990] calls the dis-embedding of social life); the adoption of neo-liberal policies by governments in many developed and developing nations (which has had the contradictory effect of undermining those governments`regulatory and redistributive roles and powers); a new level of economic competition as governments and individual communities strive to attract nomadic investors; and the growth of opposition to, as well as alternative visions for, this new world order (Epp and Whitson, 2001).

A Saskatchewan farmer offers an analysis of how globalization and world trade delays the rational application of science under industrial capitalist agriculture to the problem of soil management. She explains that “...the transnationals...do not suffer immediately from the loss of ecological balance, from the environmental degradation because they are mobile and they move elsewhere”. She goes on to argue that sustainability will require actions and changes at both the societal and individual levels.

Conclusion

Obviously, conclusions drawn from 45 interviews in two countries can hardly be the basis for any generalizations about the actions and attitudes of organic farmers. However, we do believe that we have identified some interesting patterns, many of which should be investigated further. In his discussion of the metabolic rift, Marx points out how biological processes of nature (nutrient cycles) are disrupted by the social organization of food production (the one way transfer of food from rural areas to industrial centers) which results in the depletion of fundamental building blocks of life on farms and the accumulation of waste in urban population centers. He also argues that capitalism, as a system for directing intellectual and financial resources, does not provide the logic for scientists to find ways to improve soil fertility until severe degradation has occurred (it is cheaper to obtain food elsewhere than to conserve resources). Because of the interdependence of rural and urban residents, an antagonism between the two groups of people has a tendency to develop under capitalism.¹²

We have argued in this paper that the direction of the development of sustainable agriculture is being influenced by a wide range of agents of change, including farmers and peasants and their organizations, migrant farm workers, health, environmental and animal rights activists, consumers, processors, governments, and scientists. People’s capacity to act differently is dependent on the availability of resources (social, natural, intellectual, political, and financial) and their openness to alternatives. The ability to imagine and create alternatives is influenced by the relative strength of hegemonic forces present in a social setting at any specific point in time. Some organic farmers are using the tension produced by the impact of conventional farming practices to critically examine the food system and farmers’ place in it. People often experience greater freedom to think and act differently during periods of transition when mores and institutions are weak.

¹² The antagonism between town and country will no doubt continue to exist in any economic system where inequality and unequal exchanges are not addressed. However under capitalism, the condition of the food producers and the soil is not necessarily expressed in the price to consumers. More details on product labels, such as certified organic, is considered by some as a way to permit consumers to indicate support for specific farming and conservation methods.

If sustainable agriculture is to develop to the point where it can heal the rift between nature and farming, there needs to be a much wider discussion about the current food system. There must also be a mechanism by which the research and development can be directed by local needs of both people and nature if science is to be employed rationally and not primarily in the interest of capital.

Organic standards by themselves as they now exist are necessary but not sufficient to heal the metabolic rift.¹³ For example, it is now possible to ship International Federation of Organic Agriculture Movement (IFOAM) certified products from Canada to any place in the world and still be labeled organic. If a certification system does not reflect issues of losses to local farm economies in the importing countries, dependency on exporting in the countries of origin, the amounts of fossil fuels consumed, or the movement of nutrients and water from one part of the world to another, can these practices be considered sustainable? Determining what is sustainable requires continual critical vigilance by farmers, environmentalists, governments, and scientists. Bringing about a sustainable food system will require a popular alliance of a variety of groups. While “[F]armers remain a political force but...they are clearly no longer strong enough to lead the resistance” (Mahon, 1989: 507). The extent to which today’s organic agriculture will contribute to and one day become part of a sustainable food system will depend on people’s willingness and ability to reflect critically on their beliefs and actions and make adjustments.

The cases of organic agriculture in Canada and in Sweden serves to illustrate that what farmers are able to do to heal the rift between society and nature is constrained and facilitated by the wider social context in which their own knowledge and ideological framework is formed. In spite of similarities of Canadian and Swedish farmers’ desires and concerns about the environmental consequences of conventional industrial agriculture, the social relations surrounding the development of sustainable agriculture in Sweden are enabling farmers there to move more readily into organic farming. However, healing the metabolic rift, identified over a century ago by the soil chemist Justus von Liebig and social scientist Karl Marx, remains largely unaddressed. The recycling of soil nutrients, reducing the antagonism between town and country, and eliminating the barriers to the rational application of science to soil management necessitates changes in the social relations at many different points in the food system and urban planning.

Ecological destruction is an unavoidable result of a system in which capitalism is the dominant form of relations. “Capitalism, more than previous class-exploitative societies, has an ability to destroy or degrade natural phenomena while reproducing and expanding itself both socially and materially” (Burkett, 1999: 68). Sustainable agriculture specifically and sustainable development generally can occur only once a society becomes self critical and

¹³ Magdoff et al (2000: 18) make the argument that as organic farmers make the transition from niche to mainstream markets, they will experience increasing pressure as agribusiness and giant food retailers (for example, Sobeys, Loblaws and Walmart) target the more profitable products and markets.

self transformative in regards to its dominant relations of production (Burkett, 1999: 18). Such a society also engages in ecological politics. “The development of society’s self-critical and self-transformative capabilities, so important for the transition to a concordant co-evolution of society and nature, is determined largely in and through people’s struggles for decent working and living conditions” (Burkett, 1999: 23). This is where popular visions are essential elements of liberating ecological politics. Simply stated, if farming is to be practiced pro-ecologically, we must find ways to remove or bracket-off food production from the realm of capitalist enterprise. It also requires finding social forms of economic activities and practices which cause fewer environmental problems. Organic farming is one such alternative whose practitioners strive to make artificial agricultural eco-systems as internally stable and unintrusive as possible (Clow, 2001). However, it is essential to recognize that the task of creating a just and ecologically sound food system cannot be separated from the task of producing a just and ecologically sound society (Magdoff et al., 2000: 20).

While it is essential to identify the structural and sociological features of capitalism which are anti-ecological, it is equally important not to blame all practices and institutes in a society to the same degree. If we do, we then run the risk of alienating or ignoring potential pro-ecological forces in the struggle for sustainability and the creation of popular visions. The success of popular resistance depends on a movements capacity to come together and see ecological issues as community issues. The co-evolution of society and nature and the healing of the metabolic rift necessitates that we successfully manage our social organization and its interaction with the natural environment. If not, both society and nature will be poorer because of our failures.

Further Research

Recent successes in the production and marketing of organic farm products are bringing about qualitative and quantitative changes in farming. There is a need to examine the impact of this success at the farm level to record how farm people’s actions and choices are being shaped. A number of technologies are now marketed as “compatible” with the objectives of sustainable agriculture – for example, precision farming, conservation tillage, and even genetically modified seeds. To assist people in understanding the social consequences of different technologies, a number of questions need to be researched: Who are the sponsors of the technology?; What do these sponsors stand to gain from the adoption of this technology?; Will this technology centralize or decentralize power and resources in agriculture?; How will it affect different groups of farmers?; Which technologies will be displaced?; What are the potential costs and benefits of this displacement? Do these technologies reduce or enhance the rift between farming and nature? Answers to questions like these will go a long way in helping people work towards healing the metabolic rift.

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