CHAPTER 11

Sustainable Agriculture: Growing Healthy; Growing Locally

... there is nothing more sacred than the pact between humans and the land that gives them their food.
— Janine Benyus

Unsustainable agriculture: A snapshot

Oil

In the United States today, a piece of food travels an average 1,300 miles to get onto our plate. A standard loaf of white bread requires 2½ times the amount of energy contained in that loaf to produce it, package it, and get it to us. University ecologist David Pimental estimates that society spends ten kilocalories (about 42 kilojoules) of hydrocarbons to produce one kilocalorie of food. By this standard, according to biologist Janine Benyus, most of us are eating the equivalent of thirteen barrels of oil a year.

Chemicals

The use of pesticides in agriculture grew from almost 400 million pounds in 1964 to just over 700 million pounds in 1996. Meanwhile, the amount of crops lost to pests has increased from 31 percent during the 1950s to 37 percent by 2002. Pesticides are responsible for around 25 million cases of acute occupational pesticide poisonings a year. Researchers have found significant associations between deaths from cancer and agricultural chemical
use in 1,500 U.S. rural counties. Studies are increasingly finding links between chemical neurotoxins and organophosphates, common pesticide chemicals, and developmental and behavioral disorders in children. Most of us are carrying around several hundred chemicals in our body fat that don’t belong there, according to Theo Colburn, scientist and co-author of Our Stolen Future.

Loss of farmland

Combined with all of this, agriculture is threatened with ever diminishing land available for growing food. Sprawl development is gobbling up over 400,000 acres of prime farmland every year. Further, agriculture in the United States is becoming concentrated in the hands of a few “agri-businesses.” Only one percent of Americans are growing the food that is eaten by all of us, and 87 percent of this food comes from 18 percent of the farms in the United States. Much of this agri-business agriculture produces food in monocultures — vast fields of only one crop, which, for pests, says Janine Benyus, is like equipping a burglar with keys to every house in the neighborhood.

GOOD NEWS

On the positive side, organic agriculture and the organic food business are growing rapidly worldwide. In the United States, the number of organic farmers is growing by about 12 percent per year.

Market sales for organic foods shot up 250 percent between 1996 and 2001, according to an international organic food organization. Organic food is the fastest growing segment of food sales in North America, says an organic food trade association. Organic food retail sales in the United States alone grew from US$1 billion in 1990 to US$7.8 billion in 2000 and are expected to top US$20 billion in 2005. In one year, Canadian independent grocers increased shelf space for organic products by 20 percent.

HOW MUNICIPALITIES CAN INFLUENCE AGRICULTURE

Cities, towns, and local government have enormous influence over the destiny and delivery of agriculture in their communities, whether or not they choose to acknowledge or use this influence. First and foremost is the area of land use. In the U.S. and many other countries, municipalities and county governments have the authority to designate land for agricultural use and to set development limits and standards for development on, or adjacent to, agricultural land. Second, cities and towns can influence agriculture
as an economic development activity through community economic development tools and programs. Municipalities can provide economic incentives to preferred types of businesses and to businesses that create community-desired activities, such as jobs for local residents. For example, a municipality could choose to use these types of incentives to encourage organic agriculture that uses no chemicals. Municipalities can regulate use of chemical pesticides and fertilizers through land use and public health regulations. Local governments often also control water supply, a lifeline for agriculture.

This chapter presents examples of how sustainable agriculture is flourishing in urban, suburban, and rural settings of Sweden and how a Swedish non-profit organization is promoting and supporting the organic food industry.

**Rosendal Garden: An organic farm in a city center**

In the heart of Stockholm, an urban organic farm sits within an easy bus ride of 700,000 people. At this farm, visitors stroll through fields of vegetables, herbs, and flowers, pick these, and pay for them at a nursery that also sells garden supplies, ceramics, and organic products. Winding paths take visitors through herb gardens, rose gardens, past chicken coops and rabbit hutches, where children watch and enjoy the antics of the animals.

An apple orchard produces traditional apples that are harvested and made into cider that is also sold on the property. What looks like a sunny greenhouse turns out to be a restaurant serving delicious lunches and tea with food harvested from the garden. On Sundays, hundreds of city residents and visitors fill the restaurant to overflowing, and carry their lunch trays out to picnic tables in the apple orchard.
When finished, visitors compost any leftover food in the bins placed conveniently near paths and place their crockery dinnerware — not paper or plastic — in collection tubs. This restaurant stays open in winter, selling coffee and sandwiches and attracting visitors to enjoy the snowy season in the garden and park.

Exploring other areas of the grounds, visitors encounter a beekeeper's stand selling honey made in hives located in the gardens. In another building, the aroma of freshly baked bread entices visitors to enter. Here, they can observe bakers taking out crusty loaves of bread from a Finnish-style wood-fired oven that, visitors learn, was built by a group of international craftspeople who came to Stockholm to help construct this traditional baking furnace.

This extraordinary garden and farm, Rosendal (Roo-sehn-dahl') Garden, originally served as the royal gardens for the Swedish royalty in the 18th and 19th centuries. Later in the 19th century, the gardens became an educational center for teaching gardening. In 1961, the Swedish Horticultural Society moved its training school and offices to this garden and were its caretaker until the early 1900s. Now, a private foundation, the Friends of Rosendal Garden, maintains the garden and farm, reestablishing its tradition as a gardening and farming educational center.

Rosendal Garden is located in EcoPark, 6,700 acres described as the world's first national city park. An oak forest, said to be the largest in northern Europe, covers most of the parkland. A rare oak bark beetle survives in this forest.

**EMERGENCE OF ROSENDAL'S ORGANIC FARMING**

Rosendal's organic gardens and related businesses themselves evolved organically. Greenhouses constructed by gardeners during the 1950s still operate...
today. In the early 1960s, two gardeners with experience in biodynamic gardening, a whole-systems approach to organic farming, moved to Stockholm to help restore the Rosendal Garden. They began cleaning up the grounds and planting vegetable and flower gardens. Attracted by this effort, more people came to work and garden. Volunteers began to brew coffee and bake cakes for the gardeners. Then, someone insisted upon paying for her coffee. This led to the development of a store that in turn became the present restaurant. Next, someone wanted to buy plants grown in the gardens. This led to the creation of the nursery. As word spread about the garden restoration, more people came to visit, work in the gardens, eat in the store, and shop in the nursery. The restaurant’s founder wrote a book about cooking with organic produce, which brought in even more people.

The gardens attracted more and more attention. A group of landscape architects and designers participated in a design brainstorming event that developed a series of plans for different sections of Rosendal, including a rose garden, a bench sitting garden, and fields growing combinations of flowers and vegetables.

Composting and careful soil preparation is essential to the biodynamic gardening approach that is designed around self-contained cycling and recycling of nutrients within a garden or farm. At Rosendal, gardeners compost food scraps from the restaurant to make soil for the gardens and fields of vegetables. A series of six large composting boxes turn food waste, leaves, plant materials, and manure from the chickens and rabbits into rich soil. No chemicals are used. Many Stockholm residents have learned how to compost here, says a Rosendal gardener.

People don’t always know why they are attracted to come to Rosendal, this gardener goes on to say. They come here to work, eat, or simply visit. There is a change in their behavior, she says, observing that in these challenging events of today, there is a need for a time and place to “wake up the senses.”
THE BUSINESS SIDE OF ROSENDAL

Rosendal Garden operates as a non-profit business that uses no loans or grants. Revenues from the onsite businesses — the restaurant, nursery, bakery, beekeeping, and other garden-based enterprises — cover all staffing and operating costs. Rosendal Garden and its enterprises have inspired similar urban farming projects in other parts of Sweden, for example, in the city of Göteborg.18

Maskringen Agricultural Cooperative: A community-owned farm in a suburb

In the village of Gäddvik (Yehdd'-veek), a suburb of Luleå, a 25-acre farm feeds urban families while teaching visitors and students how to grow healthy, chemical-free vegetables and meat in an energy-efficient approach. A non-profit cooperative of about thirty member households owns and operates the Maskringen (Mahsk'-ring-ehn) eco-cyclic agricultural cooperative, called Kretsloppsföreningen (Kretts'-loppsf-eh'-ning-ehn) Maskringen in Swedish. Virtually all the members have full-time jobs elsewhere and work on the farm during weekends.

The farm grows vegetables, root crops, spices, flowers, and berries. A farm stand sells produce to visitors and passersby. Cooperative members also sell farm produce at regional farmers markets. Around 50 sheep graze on the remaining farmland, keeping this free of bush and shrubs for future cultivation. The farm also produces meat, wool, and hides from these sheep, and grows hay on five more acres of land.

SUSTAINABLE AGRICULTURE IS A GUIDING OBJECTIVE

Sustainable food production is a guiding objective of Maskringen. The farm uses sustainable agricultural practices in its own farming and offers courses and workshops to teach others. For example, the farm worked hard to improve initially poor soil conditions, uses wind and water-powered water pumps in irrigation, and is experimenting with low-energy food production

Figure 11.6: Visitors can stop by to purchase healthy, chemical-free produce at Maskringen's farm stand.
techniques. Unlike Westernized food production, whose objective is to produce the maximum agricultural yield, Maskringen’s objective is to produce the optimum crop yield. Maskringen’s farming approach preserves and recycles soil and plant nutrients rather than allowing these to leach into the groundwater and disperse to the sea.

Maskringen describes itself as “a community farm based upon the belief that food can and should be raised using less subsidiary energy than that used by commercial farms.” Cooperative members point out how conventional Western food production and processing has become a fossil-fuel dominated, energy intensive operation. While the conventional food production system has grown more efficient in terms of person-hour labor, it has become inefficient in terms of energy use. The Maskringen cooperative is working with students from the nearby Luleå University of Technology to analyze the food energy return for energy invested at the farm in order to help find ways to further reduce energy use.

**FOOD-ENERGY RATIO**

One student’s analysis found that the amount of energy obtained from eating the cooperative’s vegetables was about four times more than the energy amount used to produce that food. The student compared Maskringen’s food-to-energy ratio to that of the United States’ food system, where, for every calorie of food produced, six calories of subsidy energy have been added in the growing stage. If distribution and packaging is included, the U.S. food system adds ten calories of subsidy energy to every calorie of food.

**SUSTAINABLE AGRICULTURE TECHNIQUES**

To improve the soil, initially full of sediments and low in nutrients, Maskringen members worked to increase the soil’s organic content, nutrients, and biological life. Cooperative members developed topsoil by mixing existing soil with compost, leaves, and manure from sheep and chickens. The farmers planted nitrogen-fixing legumes, such as beans and peas, and added raw phosphate, since the existing soil levels of this mineral were low. They used generous amounts of old hay to mulch vegetable beds. Urine is collected from urine-separating toilets and diluted with water to fertilize seedlings. (Urine, which is sterile, has a good balance of two key ingredients needed for plant growth — nitrogen and phosphorus.) Through these methods, the cooperative’s farmers developed a rich, living topsoil full of earthworms that dig through, drain, and fertilize that soil.
In the center of the gardens and vegetable beds, Maskringen farmers constructed a pond where a biological diversity of frogs, salamanders, dragonflies, and birds has developed. Wind-powered pumps bring water from an underground well to this pond. A water-powered pump brings more water from the nearby Luleå River into an irrigation system that distributes water and nutrients to all parts of the farm.

The Maskringen farm cooperative demonstrates how it is feasible for urban and suburban dwellers to grow and store food locally without the use of chemicals or huge amounts of energy, and how nutrients can be reused and recycled without contamination.23

A small family farm gets organically certified

In rural Kalix, a family is running an organic farm and dairy that was founded in the 1600s. Maria and Michael Lundbäck have been managing this farm since the mid-1980s. The couple owns 50 acres and rents another 60 acres of land used for either cultivation or pastures. The farm also includes over 600 acres of forestland where timber is harvested using selective cutting methods that keep within the forest’s ability to regenerate. The harvested lumber, used primarily for window framing, contributes about 30 percent of the farm’s income. Maria and Michael grow hay, grass, oats, barley, and vegetables including carrots, lettuce, cabbage, cauliflower, broccoli, squash, cucumbers, beans, onions, leeks, and peas. They sell this produce, all organically grown, to local Kalix grocers and markets.

Before the Lundbäcks arrived, the land was farmed conventionally. Among other things, this meant that previous farmers had used chemicals to control pests and fertilizers to speed plant growth. To qualify for national organic certification in Sweden, a farm must be free of chemical use — pesticides, fertilizers, or herbicides — for at least one year. Michael and Maria began the changeover to organic farming methods in 1993. Since then, the farming couple has used no chemicals to control pests. Instead, they plant a diversity of crops and flowers to reduce the chance that one pest can wipe out a whole crop, as is the risk with monoculture farms. This farm rotates crop plantings with clover, which fixes nitrogen in the soil. The clover attracts bees that also help

Figure 11.7: A traditional Swedish hay barn allows the hay to air-dry. When the hay is dry, farmers remove the rack poles to allow the hay to drop, then compact naturally. Each mobile barn load creates one ton of hay.
reduce pests. Soil is composted with cow manure, eliminating the need for artificial fertilizers.

While organic farming may not produce the same volume of produce as can industrialized farming, organic farms in Sweden can earn 50 percent more in sales revenues for certified organic produce than they can for produce that is conventionally farmed. Conventional Swedish farms receive a 30 percent government subsidy to stabilize farm income. For organically certified farms, this subsidy can be as high as 50 percent.

Maria and Michael also operate a dairy as part of a farmers' cooperative called Norrmejerier (Nohrr'-mehyeh-ree'-ehr). Their dairy consists of 12 to 15 cows, primarily Jerseys, as well as a few cows of a long-time Swedish native breed. The farm also uses four horses to plough the fields, eliminating the need for fossil-fuel based tractors and equipment. The manure from the cows and horses fertilizes the fields. According to Michael and Maria, more and more farmers in the Kalix region are realizing they can save money by using manure instead of artificial fertilizers.
Although their cows eat grass and hay that is free of chemicals, the Lundbäcks have not yet applied for organic certification of their dairy’s milk. The reason, says Michael, is that the cooperative does not pay enough of a premium price yet for certified organic milk to make the costs of certification worth their effort. Further, there is not enough organic milk produced in the vicinity to pay for the cost of a separate truck pickup. As of 2001, however, Michael and Maria were planning to begin cheese production at the dairy.

**Kostservice: An organic agriculture “eco-niche”**

In the town of Övertorneå, a public organization produces 1,000 meals a day for school children, daycare centers and elders. Kostservice delivers food to two schools, eleven daycare centers, and delivers lunches and dinners to elders in their own homes seven days a week. The agency also runs a restaurant in Övertorneå’s town hall annex, dubbed by one happy customer as “the best restaurant in Sweden.”

Kostservice’s mission is to provide healthy balanced meals for its clientele. Its food, primarily organic, is grown in the Övertorneå region. Each meal has a vegetarian alternative. KRAV, a Swedish non-profit organization for organic food production, certifies food and meals produced by this food service agency. At least once a week, Kostservice prepares a 100 percent KRAV-certified meal. Once a year, KRAV representatives visit to inspect the business, ensuring standards are met. The Övertorneå food service company is one of the 225 KRAV-certified restaurants and industrial kitchens in Sweden.

This food service, one of the more than 200 eco-enterprises developed during Övertorneå’s eco-municipality journey, created 13 jobs for local workers and has over US$1 million in annual revenues, another example of how to do well by doing good. For more about Övertorneå’s journey to become Sweden’s first eco-municipality, see the Introduction.
“KRAV makes sure it’s organic”
(from KRAV brochure of the same title)

KRAV is a key player in Sweden’s organic food market. Run by an independent board of agriculture and environmental experts, farmers, consumers, animal welfare activists, and food industry members, KRAV develops standards for organic foods, inspects for those standards, and promotes organically certified food throughout the country. The organization inspects and certifies vegetable and meat products, farming land, commercial kitchens and restaurants, farms and dairies, and slaughterhouses for compliance with organic standards. Almost 5,000 Swedish farmers, food processors, restaurants, and retailers work with KRAV to secure and maintain organic certification. The international arm of the organization, KRAV Kontroll, works with more than 40,000 farmers and food processors around the world, primarily in underdeveloped nations. No operation is too large or too small to receive certification. For example, Michael and Maria Lundbäck described earlier, work with KRAV as their organic certifier. The Scandic Hotel chain, described in Part I, received KRAV’s organic certification for all its restaurants in 2001.

PRINCIPLES FOR ORGANIC CERTIFICATION

KRAV’s standards are based upon four principles: a healthy environment, good animal husbandry, good health, and social responsibility. KRAV-certified agriculture uses no chemical pesticides, herbicides, or commercial fertilizer. Instead, certified organic farmers rotate their crops to control weeds and pests. Crop rotation also adds nutrients to the soil instead of depleting it through continually replanting the same crops on the same land. For fertilizer, certified farmers use animal manure primarily from their own farms.

KRAV applies the precautionary principle in its standards, meaning that the organization withholds certification of foods and substances that are not “unanimously shown to be harmless.” Based upon this principle, certified products do not include any genetically modified organisms or substances. KRAV works with its associates to see that all links in the food chain — from the field to the table — meet its standards. For certification of animal farms, dairies, and slaughterhouses, their animals, including cattle, pigs, sheep, and chickens, must have indoor and outdoor free range, eat organic fodder, have spacious living and birthing quarters, and receive calm and humane treatment prior to, and during, the slaughtering process.
STANDARDS FOR SOUND, RESPONSIBLE WORKING CONDITIONS
KRAV also assures healthy and safe work conditions for farming and food-processing employees. This is particularly important for the organization’s 40,000 international producers in developing countries, where hazardous chemicals and poisons proliferate in farming and food production. Farms and food producers found deficient by KRAV standards can be decertified by the organization. The organization’s standards for social responsibility also stipulate that farmers and workers should receive a reasonable income and work in safe and healthy conditions.

KRAV also practices what it preaches. The organization tracks its own environmental performance, such as the amount of fossil fuels used by its traveling inspectors and how much paper is being used and recycled. KRAV and its employees continually work to improve their own environmental actions.

TRACKING THE MARKET FOR ORGANIC PRODUCTS
KRAV also tracks information about national and international trends on organic food production. Its rapidly growing clientele attest to the competitive advantage that certified organic food products and producers are gaining in the marketplace, as Michael and Maria Lundbäck point out. According to surveys of the organization’s clientele of farmers and food businesses, 93 percent believe that KRAV certification has gained them a market advantage. Surveys also reveal that 93 percent of Swedish consumers recognize the organization’s label as an environmental and a quality certification. As clients and consumers attest, the KRAV label can “make sure it’s organic.”

North American examples
In the United States and Canada, organic farm cooperatives are growing fresh healthy organic produce for their members, helping these farms to survive economically and also keeping land in cultivation and away from unwanted development. These community-supported agriculture cooperatives (CSAs) sell shares to household members for US$300 to $600 per year, which entitles member households to several months of fresh organic produce, locally produced and provided weekly. The share payments provide the farmers with a secure annual income, against which they can borrow to purchase equipment and seeds. First developed in Japan, the CSA concept took root in the New England region of the United States during the 1980s. As of 2003, over 1,000 CSAs are now operating throughout North America.
Community based organizations, such as the Dudley Square Neighborhood Initiative (DSNI) in Boston’s Roxbury neighborhood, have turned vacant urban lots into productive, attractive farm lots where neighborhood residents, who often struggle to make ends meet, can grow their own food. In Philadelphia, Pennsylvania, the Greensgrow Farm, assisted through a community development corporation, grows greenhouse vegetables on one of the city’s 30,000 abandoned lots, selling this produce directly to city restaurants. A Chicago coalition is giving homeless people job opportunities through growing greenhouse organic produce on a one-acre former brownfield site, and more organic produce at a ten-acre site in a Chicago suburb. Over 40 percent of households in the Vancouver and Toronto regions are now growing some of their own food, according to Canadian surveys.26

Some local and regional governments, such as Lancaster County, Pennsylvania, 60 miles from Philadelphia, have combined zoning with a package of conservation techniques to protect 25,000 acres of prime farmland. In the agricultural district, county zoning allows only one building lot of 2 acres per 25 acres of land. The State of Oregon has made farmland preservation one of its statewide planning goals and requires local comprehensive plans to address this.