Urban Agriculture and the Future of Farming in the United States

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Introduction

The procurement of food is perhaps the most basic necessity of life, and yet what we eat and the way we eat has never been so hotly debated. Authors like Michael Pollan and Morgan Spurlock expose realities of our current system of food production that can make readers feel squeamish at best and, more frequently, morally outraged. So these questions beg to be asked: How did we get to this point and in what direction should we head? This paper will examine the development of agriculture and look at the role urban agriculture can play in creating a new paradigm for food production in the United States.

The Origins and Development of Agriculture

For most of his history, mankind has supported himself through the hunting of wild animals and foraging for wild plants. Since little food was grown and stored, life was a constant struggle against starvation. The escape from this existence began 10,000 years ago with the domestication of plant and animal species. This revolution spread throughout the world until all but a handful of hunter-gatherer tribes remain today.1

The exact origins of agriculture are unknown since the development of farming predated the advent of writing. It is believed that agriculture developed simultaneously in multiple sites throughout the world, including the Fertile Crescent of Western Asia, Egypt, India, China, parts of Africa, and several regions in the Americas. There is no consensus amongst researchers as to the exact cause of this development. However, either because of an increase in population or population density, the carrying capacity of the immediate environment was surpassed.2 Because planted crops yield far more tons per acre than wild roots and berries, agriculture was a far more efficient way to support larger populations with more food for...
By 6,000 BC, mid-scale farming was firmly established in Egypt, and agriculture had developed in the Far East with the cultivation of rice and highly organized systems of net fishing. These new systems allowed for a population boom that continues to this day. By 5,000 BC, the Sumerians had developed agricultural techniques including large-scale intensive agriculture, monocropping, and organized irrigation. Agricultural efficiency continued to improve through the Middle Ages with the development of irrigation systems based on hydraulic and hydrostatic principles, a three-field system of crop rotation, and the moldboard plow. The rapid rise of mechanization in the 19th and 20th centuries allowed farming to be performed increasingly efficiently and at larger scales.

The development of agricultural technology that occurred between 1943 and the 1970’s became known as the Green Revolution. The implementation of energy-intensive farming techniques such as the use of pesticides, synthetic nitrogen fertilizer, and hybridized crop varieties resulted in unprecedented crop yields. Worldwide grain production increased by 250% between 1950 and 1984, while the world population merely doubled. While the use of these techniques has radically dropped food prices and increased food security in western countries, it has done so at a high cost to the environment, public health, and economic security for agricultural workers.

Problems of Industrial Agriculture

Land degradation is one of the most troublesome outcomes of modern farming techniques. This can present itself in the form of soil erosion, deforestation, acidification, salinization, and nutrient depletion. Secondary effects of these processes can add to environmental degradation. For example, erosion of nutrient-rich topsoil contributes to the eutrophication process of algae. Under these circumstances, the algae population rapidly explodes, decreasing the water’s oxygen content, resulting in fish kills, loss of bio-diversity, and the contamination of drinking water. Livestock production in particular is a massive contributor to global warming. It uses 30% of the land surface of the planet and is responsible for 18% of the world’s greenhouse gas emissions relative to carbon dioxide emissions. Additionally, it generates 65% of human-related nitrous oxide, which has 296

Fig. 02 Illustration demonstrating the increase in wheat production since 1961
times the global warming potential of CO2, and 37% of human-induced methane. It also produces 64% of the ammonia, which contributes to acidification of ecosystems. \(^7\)

In addition to environmental damage, industrial agriculture is implicated in multiple public health problems including pesticide and food poisoning, increased cancer risk, obesity, and malnutrition. Food recalls due to contamination by salmonella and e. coli are becoming increasingly common. \(^8\) The World health organization attributes 220,000 deaths per year to pesticide poisoning, and long-term exposure to pesticides has been linked with higher cancer rates. \(^9\) And the most ironic of health problems, is the simultaneous increase of obesity and malnutrition. There are communities across America, most often low-income, inner-city neighborhoods, where cheap, fast, nutrient-depleted food abounds. Because it is almost impossible to find fresh produce, these neighborhoods have to come to be known as “food deserts”. \(^10\)

The Green Revolution also made a significant socioeconomic impact on farmers. Since industrialization required higher startup costs than more traditional farming techniques, farmers often went into debt, which in many cases resulted in the loss of their farmland. Because wealthier farmers had better access to credit and land, the Green Revolution increased class disparities. \(^11\)

One of the greatest challenges facing industrial agriculture is its reliance on fossil fuels. Direct consumption on farms includes the use of lubricants and fuels to operate farm vehicles and machinery. Indirect consumption is mainly due to the manufacturing of fertilizers and pesticides. Finally, since industrially produced food travels an average of 1,500 miles from farm to fork, transportation is a major consumer of fossil fuels in this system. For this reason alone, it is evident that this current system of food production cannot be sustained as oil reserves are depleted. The question is whether we will implement new methods of food production before the worldwide famines become a reality.

**Why Urban Agriculture?**

Urban Agriculture provides a viable alternative to today’s standard methods of food production. Urban Agriculture is the growing, processing, and distribution of food through intensive plant cultivation and animal husbandry in and around cities. \(^12\)
Because the initial development of cities 10,000 years ago was a direct result of agriculture, it is only natural that agriculture should be intrinsic to towns and cities and contemporary society. Opportunities for urban agriculture are almost endless as this type of agriculture can occur on virtually any scale and in any location, from a window box garden to a multi-acre site. They can be located in greenbelts around cities or in vacant inner-city lots. They can be privately owned, commercial enterprises, municipally run, or non-profit endeavors.

The benefits to the environment and to society offered by urban agriculture are just as numerous as the many physical forms it can take. An increase in green spaces results in cleaner air, lower summer temperatures, humidity regulation, and the reduction of greenhouse gases. It also provides noise filtering and promotes biodiversity. Urban agriculture can use its own waste and that of its community to create more food through the composting of organic matter and processing of grey water.

Purchasing food that is locally grown decreases energy needs and costs associated with long distance travel and refrigeration. Fruits and vegetables shipped between states can spend 7-14 days in transit. Nearly 50% of food is lost before it ever hits the shelves. Because of this, most varieties of produce sold in stores are selected based on their ability to handle extended travel. Growing locally would allow for greater varieties of crops that are selected for their taste and nutritional qualities rather than their shelf-lives.

The physical and mental health of residents would improve with access to more nutritious food and opportunities for exercise associated with gardening. Gardening 3-4 times per week has the same health benefits as moderate walking or moderate bicycling. The ability to influence their immediate environments creates a sense of empowerment in individuals, which can also help to reduce stress and anger. Green spaces create a sense of community through providing a place for social gatherings. In general, when the food security of a community increases, crime, health care costs, and requirements for city services decrease.

Fig. 05 Urban farming in Cuba

Fig. 06 Intercultural garden in Munich
Finally, urban agriculture can provide numerous economic benefits to a community. In addition to the obvious reduction in food costs, it can provide opportunities for entrepreneurship and create local jobs. The full economic potential of urban agriculture becomes apparent when considering the possibilities for regional food connections. Maintaining regional and local farm to consumer enterprises helps keep the entire industry accountable for the food system, increasing the likelihood that food is produced and consumed in sustainable ways and helps support the local economy.

**Urban Agriculture in Munich**

Munich provides examples for multiple types of urban agriculture which can serve as useful examples of systems that could be implemented in the United States. The City of Munich owns approximately 5,000 acres of farmland and 12,000...
acres of forest. In addition to these municipal farms, there are over 800 participatory gardens in Munich where approximately 50,000 people work collaboratively. Munich is one of the few remaining German cities to own its own farmland. The Stadgüter München is a collection of urban farms owned and operated by the city of Munich, half of which are ecologically certified. The land consists of a greenbelt surrounding the city and twelve other farms in the area. Munich began acquiring land about 100 years ago to allow for urban growth and is one of the few remaining German cities to own public farmland. The land serves multiple functions including food production, research of soil and water quality, education, rehabilitation of native habitats, and as an area for leisure. Additionally, lands that are unsuitable for food production due to environmental contamination are used for biogas production.

The farms currently feed about 10,000 Munich residents using a system similar to the Community Supported Agriculture farms in the United States. Fresh local fruits, vegetables, and dairy products are delivered to subscribers’ doors on a weekly or bi-weekly basis. Residents can also obtain these goods three days per week from the retail shop located on the farm. The farms also supply food to the cafeterias at local kindergartens.

Allotment gardens are a collection of parcels of land that are rented by individuals or families and are the most widely-used community agriculture typology in Munich. There are approximately 100 different allotment gardens in Munich with 35,000 users. These plots are cultivated individually rather than collectively tended, as in other types of community gardens. They range in size from 500 to 4,000 square feet and often contain a small shed for tool storage and shelter. The gardeners are organized in an allotment association which leases the land from owner, who may be a public, private, or ecclesiastical entity. The gardeners have to pay a small membership fee and must abide by the organization’s by-laws.

Originally called “gardens of the poor”, gardens of this type originated in Germany in the 19th century and were developed in poor, immigrant neighborhoods as a means to provide food security for neighborhood residents. This concept was further developed during the First and Second World Wars when food security was a problem facing the country as a whole. While food production is still a considerable benefit of this type of garden, they are now used primarily...
as a place for community interaction and recreation.\textsuperscript{17}

Krautgartens came from Vienna to Munich in 2004 as a response to the high-demand and limited availability of allotment gardens. The herb garden parcels are smaller than those typically found in an allotment garden and appeal to a new demographic of people. The land is rented from May to November and then returned to the farmer at the end of the growing season. There are currently twelve krautgartens with about 2,000 users in Munich.\textsuperscript{18}

The first intercultural gardens were established in Germany in 1996 as a means to promote relationships between refugees, immigrants, and native-born residents. The gardens provide an avenue for community participation and are seen as an ideal opportunity since many immigrants and refugees come from small farming communities and can apply their farming knowledge in Germany. Like the other types of garden already mentioned, the land is divided into parcels for growing vegetables and herbs, including varieties from immigrants’ countries of origin. These spaces are also used as a recreational area for children and a place to hold community events and meetings.\textsuperscript{19}

Munich also has about 300 educational gardens located at more than 40\% of its schools, 3 therapeutic gardens found at nursing homes, and another 5,000 gardeners in private residences.\textsuperscript{20} In addition to these more conventional types of community garden groups, Munich has two groups of Guerilla Gardeners consisting of about 40 participants. Guerilla gardeners can now be found worldwide and are a group of rogue gardeners that inde-
pendently green public spaces without approval and at their own expense. They typically focus on greening neglected and impoverished urban spaces. They establish relationships with local residents and businesses and encourage their participation in the project through the maintenance of the space.21

Potential Criticisms of Urban Agriculture

While not intended to be a comprehensive list, the following are some obstacles and potential criticisms that could be encountered regarding urban agriculture:

Many involved in urban agriculture do not own the land they use to grow food. Without title or long-term leases, they run the risk of losing their investments.

Solution:
• Some sites are operated under usufruct agreements, meaning that as long as the property is well maintained, the growers maintain the legal right to use the property.22
• Areas such as rooftops, roadsides, and institutional property rarely have other uses.
• Many types of urban agriculture can be mobile or require little investment. These types are well-suited for short-term or more uncertain leases.

Start-up costs can be prohibitive for people on limited incomes. Often these are the same people at which community gardens are directed.

Solution:
• Financial support can be found through grants, microcredit loans, community donations, etc.
• Many communities have tool banks that will loan or rent tools at a reasonable price.

Marketing of locally-grown foods can be challenging when in competition with wholesale distributors.

Solution:
• Food buying groups and cooperatives are popular ways for consumers to pool their orders.
• “Buy Local” and “Slow Food” campaigns are increasing the demand for locally produced foods.
• School boards and health agencies can work with farms to bring local food into institutions.

New urban farmers may lack the knowledge and skills required to
In many climates, food production is not always viable as a year-round source of food security.

Solution:
• The use of greenhouses, waste heat, etc., can extend the growing season considerably.
• Urban agriculture educators can teach canning techniques, often employing the knowledge of elderly members of the community.

Many areas of city land can be contaminated.

Solution:
• Raised beds can be used so that growing soil is separate from contaminated ground soil.
• Low-cost soil testing is available to determine whether or not a site is contaminated.\(^2\)
• Sheltered production methods can be used such as greenhouses, indoor production, hydroponic growing mediums, etc.

Gardens could be subject to vandalism and crime.

Solution:
• Incorporate youth programs to provide constructive activities and leadership opportunities.
• Community gardens help cultivate good relationships with neighbors and law enforcement, creating a “human fence”.
• Higher foot traffic from community gardens can increase the safety of sparsely populated areas by keeping “eyes on the street”.

The only way to grow enough food to feed the world’s population is through industrial agriculture.

Solution:
• Small farms can be 4-100 times more productive in total output per acre than industrial farms.\(^2\)

Small-scale and sustainable farming techniques are too expensive.

Solution:
• Growing your own food organically is less expensive than buying indus-
trially produced foods at retail prices. • The price tag on industrially pro-
duced foods does not reflect the added
costs of environmental clean-up and
healthcare. Growing food in a sustain-
able way will decrease the overall cost
of living.

Is an agricultural revolution pos-
sible?

According to John Jeavons and Ecol-
ogy Action, a human being can feed
himself on as little as 700 sq. ft. of
garden space.25 Granted, most people
would prefer a diet with more variety
than this size of space allows, but a
comfortable existence would be pos-
sible. If one adds the space available
in residential yards, public parks,
commercial green spaces, etc., there
are 7,000,000 acres of existing green
space in cities.26 If all of these spaces
were used for food production, we
could feed 434,000,000 people - about
40% more people than currently live
in the United States today. Millions more
could be fed if land area occupied by
rooftops, about 30% of the average
city’s total land area, were turned into
areas for food production. The amount
of land area available for farming
continues to climb when consider-
ing the 130,000 to 425,000 brownfields
identified by the U.S. General Account-
ing Office as areas that could be safely
converted to agricultural purposes
when properly redeveloped.27

The reality is that in the not-so-distant
past the United States has shown its
ability to truly effect a radical change
in food production. At the beginning of
World War II, victory gardens emerged
as a way to produce food and reduce
demand on materials used in food
processing and canning. The USDA
estimated that in the final three years
of the war over 20 million garden plots
were planted producing 9-10 million
pounds of fruits and vegetables per
year, which is about 44% of the total
amount of fresh produce in the United
States.10 Examples like this and those
found in Munich demonstrate that
massive, large-scale change is pos-
sible and that urban agriculture is a
viable alternative to current methods
of food production.

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Figure 12: Sprouts in the Sidewalk, Garden Built out of a London Bomb Crater, JPG, http://sidewalksprouts.wordpress.com/history/wwii/

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