

Turning brownfields into “green fields”: growing food using marginal lands

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Abstract

The current food system is dependent upon the prevailing industrial [rural] farming system that rests upon cheap energy, surplus fresh water, unlimited land, and relatively stable climates. In the twenty-first century, all of these resources are in steep decline and yet the demand for food is growing exponentially due to rising standards of living and urban population increases. Located in and near urban populations are brownfields that are often a blight on the community and are viewed as a drain on resources for rehabilitation, given the need for return on investment of those rehabilitation funds. With the increasing affluence of consumers globally, along with the increase in population, the need for increases in food production continue to intensify. The possibilities for creating an ecologically sustainable, ‘new urban food production system’ is limited only by our imaginations. If the focus is the growing of fresh food, locally/regionally, year round, the opportunities are huge. The paper explores partnering of brownfield rehabilitation with the principles of sustainable food systems, and how these principles can be used to create a new, ecologically friendly, urban/periurban, knowledge-based, twenty-first century “food production” system that includes:

- use of marginal land to expand productivity, and
- create green-collar jobs, and
- keep food dollars in the local/regional communities.

Keywords: brownfields, green fields, sustainability, food systems, resilience, urban food system.



1 Introduction

Brownfields present a unique opportunity for communities. However, no definitive definition exists that all nations accept when defining what constitutes a brownfield. Instead, the concept remains a matter of perspective and interpretation, which inhibits full view of the potential that exists within brownfields for the community.

As defined by the US Federal Business Liability Relief and Brownfields Revitalization Act [1], brownfields are abandoned or underused property that appears to have little or no apparent economic value to the community, partly due to real or perceived contamination issues. However, this is a shortsighted view of the potential that may exist through removal or rejuvenation of these apparent blots on the landscape. Additionally, the potential of job creation through a sustainable approach to these properties may revitalize the community. Through the collaborating of brownfield rehabilitation with the principles of sustainable systems, new ecologically friendly urban/periurban rejuvenation may return these blighted properties to productivity.

According to the US Environmental Protection Agency (EPA) [2], the Brownfield rejuvenation program created 74,809 jobs across the US and that more than 485,000 remain in the US. This shows the upside potential of job creation by addressing this issue. With the breakdown of local economies, rising unemployment and the declining tax income from derelict properties, addressing brownfields involves a complex dance around political, social, and economic issues. Each involves different components as the stakeholders integrate their direct and indirect agendas and interests.

Though sustainable activities exist across industrialized nations, alternatives remain unexplored. Each of those who have tried to solve these old issues creates new problems with their solutions. This shows the complexity of creating a single definitive solution to brownfields. With the increasing population of the world and the diminishing eco-system and greenfields to sustain it, food safety and security remain an international concern that will demand our attention either now or later. Current evidence may indicate slowing of crop yield growth in industrialized nations, which means that later, may be too late.

2 Current understanding on brownfields

Brownfields exist all over the world and may compete for regeneration funding, from public and private sources. Part of this is due to the number of brownfield sites, which remains incalculable due to the varying definition from industrialized nations. As awareness of environment change continues to grow, the nations of the world establish priorities and strategies aimed at addressing what to do with these properties based on stakeholder input. This creates conflicts of interest as some stakeholders deflect attention from one brownfield to another in hopes of not addressing landowner liability.



To this point, European cleanup efforts start and sometimes quickly progress to finger pointing to determine who will pay for the clean. However, this is changing. The CABERNET Network Report [3] indicates recognition of this problem and an attempted to bridge that gap and move rejuvenation forward. To that end, the European Environment Agency (EEA) began a 5-year strategy in 2009 in hopes of establishing linkages between the various ecosystems across Europe [4]. The approach is to create a consensus between stakeholders that promotes sustainability objectives. Success or failure of this strategy will be revealed shortly.

The EPA created technical expertise, financing, and grant funding to move rejuvenation and reuse efforts forward. The list of success stories appears to be endless. Grants require a cash match and a limit of \$200,000 per site. Assessing ownership liability appears absent in the hope to have the old or new owners proactively involved with the cleanup process as presented in the Small Business Liability Relief and Revitalization Act [5].

Ultimately, rejuvenation of brownfields requires a prioritization based on financial and economic realities. Some properties require little governmental or public assistance, while others may demand extensive support that makes them infeasible. Private, public, and joint projects become vital for brownfield reuse possibilities. Current rejuvenation efforts include the creation of community or urban gardens to the revitalization of entire communities through refurbishment of old structures and the building of new ones. Success stories exist in every industrialize nation. Land is a key resource for communities and vitally important for food security and sustainability.

3 Urban growing

The beginnings of urban farming can be seen with window box and small yard plot gardens providing greens and herbs for these urban farmers. In the mid1940s throughout the US, these victory gardens contributed 40% of the produce used in the US. Though the idea waned, resurgence is on its way as green has come in vogue once again. This shift may move food reliance to ecosystems that support local trade and create green jobs.

According to the Urban Agriculture Report in 2011, cities such as Atlanta, Georgia now see the benefit of providing locally grow foods to the population. The office of sustainability now permits and promotes this direct connection between growers and consumers in local food markets. Overall, this concept of brownfield growing is leading towards changes in zoning such as the Go to 2040 in Chicago, Illinois, which uses incentives to convert vacant lots and rooftops for agricultural use [6]. Detroit Michigan has plans for urban based farming to provide “75 percent of fresh vegetables and 40 percent of fresh fruits” [7] for the residents. This level of supply requires a rethinking of land use regulations, which does come with legal challenges that present barriers to this type of sustainability. However, this promotion of sustainability does not go far enough in that it still requires uses of vast tracks of land within the urban setting in these community gardens.



The urban gardens provide the opportunity for groups of local resident or individuals to produce food crops and ornamental flowers. Zoning dictates whether the crops may be sold for profit or restricted to personal use. Some cities grow food to donate to shelters. At issue, are the number of spots available and the number of potential growers waiting their opportunity?

Alternatives to traditional farming provide better opportunities for these brownfields. A shelter in northeast London created an alternative to urban growing by utilizing the roof and available space within the building to grow food and livestock. The products of this venture are sold in the main floor shop and range from eggs to salad. Gotham Greens in Brooklyn New York converted a warehouse roof into a high-tech 15,000 square foot greenhouse farm to produce locally grown vegetables and greens for the local community. The company found this venture to be so successful that plans exist to build another greenhouse [8].

Zoning plays a role here as well as the sale of foods. Zone dictates how high a building may be and its use. By building greenhouses on roofs, the building requires a variance. As with Gotham Greens, each new location requires a variance. Extrapolating this concept would indicate that successful rooftop greenhouse would each require a variance, which begs the question on whether the zoning should simply be changed to allow for this new function.

4 Brownfields to grow food: opportunities and challenges

One of the greatest opportunities presented by utilizing brownfields to grow food is the ability to harvest in the morning and sell by the afternoon. The problem is that most urban agriculture happens in a sporadic and often disjointed approach by individuals, public, and private sectors, often all vying for the same limited amount of arable land. Until there are systemic assessments of urban agricultural on both “scale” and needed land, many opportunities for growing may be overlooked or under-utilized. The first step is to define brownfields, perhaps in levels of contamination, and then to begin to audit open, marginal, and brownfield lands within urban areas. Brownfields present many opportunities to communities, but they are not without challenges. Contaminated soil poses a risk of the pollutant being absorbed and passed through to the consumer if the existing soil is used in the food production process. Despite this risk, no federal guidelines exist within the US [9]. These guidelines are just the first step. For without such guidelines, open land in and around urban areas cannot be categorized for suitable use.

Just as problematic is the lack of comprehensive understanding of how to create a level of food “resilience” within the community, without first knowing the real food needs of the larger urban community. This need for “food shed” assessments/audits is just in the beginning stages in the United States. Small towns, periurban communities, counties, regions, and states are all in the process of assessing how to create a meaningful infrastructure to encourage local food production. Yet, few, if any, of these food council survey activities have first assessed the availability of land – including brownfields as possible “green



fields.” Table 1 [10] begins to show the levels of production that could benefit from a thorough categorization and utility of brownfields in and around urban areas.

Table 1: Scale of urban agricultural (UA) production.

Scale	Examples of scale	Broad ownership Categories of UA land and produce
Micro		
	Green roofs, walls, courtyards	Private, corporations
	Backyards	Private
Meso		
	Community gardens	Private, on public land
	Individual collective gardens	Private
	Urban parks	Public
Macro		
	Commercial-scale Farms, e.g. turf, dairy, orchard, grazing, (e.g. horses	Private, corporate
	Nurseries	Private, corporate
	Greenhouses: Floriculture and Vegetables	Private, corporate

Note: Ownership is categorized as private when owned by individuals with fully assigned property rights; corporate when owned by shareholders so that decision making is collective or may be assigned to corporate officers; and public when owned by government and managed for social outcomes, e.g. schools.

4.1 Brownfield redevelopment: landfills, food waste and contributions to growing food

Many of the largest brownfields that need to be considered in creating food production opportunities are landfills. The US EPA, in the early stages of looking for uses for capped landfills have found that there is a potential 30-year window for the production of methane gas from such a landfill. As society moves to diversify sources of renewable energy, capped landfills may be a vital overlooked resource.

In recent years, in the United States, scientific studies have begun to take place regarding gas dispersal and health assessment risks [11]. Capturing the flared methane gas can create an alternative fuel for use in food production, transportation of food to nearby urban markets, and perhaps co-location of anaerobic digesters for food waste that can be diverted from, and reduce the need for additional landfills.

For those looking to redevelop landfills for integration into food production in urban areas, care must be taken to understand the potency of the toxicity of gas dispersion, and looking at alternative food production methods. Perhaps there is



an opportunity to develop public/private partnerships with commercial food producers, given the technologies that will be needed to mitigate the risks of using such a site for large-scale food production, closer to where the consumer lives in the urban core.

4.2 Brownfield redevelopment: recommendations

Though some collaborating exists in the US and Europe, the level falls short of to meet the needs of current and future demand. Given the growing issues of diminishing green fields and the growing population, alternatives are an imperative for long-term sustainability. The mix of private, public, and private-public projects ensures some movement, but the level of cooperation and landowner liability issues must be addressed in such a way that rejuvenation is not inhibited. This requires the acceptance and involvement of the public in these projects to defuse public concerns with facts that establish trust and credibility.

An additional result of increasing brownfield development projects will be the creation of green jobs. The need for expertise will increase with these projects, which will result in the demand for a new labor force at a time when unemployment is at an unexcitable level.

Dramatic zoning changes will open the door and remove obstacles that hinder needed projects. This is not to say that the government should remove all barriers, as citizen safety remains an issue. However, requiring every rooftop greenhouse to receive a variance increases costs and reduces productivity of locally grow foods. The development of general criteria that maintains a safety net would allow more urban and community farmers to do what people have done since farming began, feed themselves and the periurban community.

Given the risk for brownfield contamination, installation of vapor monitors could mitigate the risk through an early warning system. This would abate vapor intrusion as a risk or barrier to redevelopment of brownfields [12]. The extent of the risk and cleanup required depends on the type of prior use contaminate. Sampling of the soil provides vital information about prior use and the level of contaminates that may create safety risks. In addition to monitoring and sampling, the EPA created effective models that assess risk and exposure to increase the number of rejuvenation projects. The key again is to establish a partnership with the public by replacing fear with knowledge.

Continued research and development of alternatives is necessary to obtain sustainability. Ignoring brownfields and the potential they bring limits the world to a decreasing availability of green fields to grow food.

5 Conclusion

Brownfield rejuvenation provides an alternative to the diminishing green fields and the growing population. Sustainable solutions to growing food are of concern for the entire world. The level of activity within industrialized nations varies greatly and depends on the accepted definition of brownfield. Of concern



is the haphazard method of funding projects and myriad of legal issues that one must navigate to begin a brownfield renovation project. This, in addition to landowner liability issues, prevents many projects from moving forward. Safety is a concern, but inactivity or neglect of potential alternatives is of greater concern. We can choose to address the issue now in a proactive manner or wait until the issue demands our involvement causing us to react to the crisis of the day.

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