DESIGNING THE CARROT CITY: FOOD SECURITY AND THE DESIGN OF SUSTAINABLE BUILDINGS AND CITIES

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Abstract

Despite the importance of the food sector in the functioning of cities, the link between sustainable built forms and food production, distribution and consumption is a new area of study. The emerging alternative food movement has barely engaged with the possible contributions that designers and the design process can make to develop an alternative to the food supply chain. This paper will discuss a series of projects that speculate about the potential for integrating food production into the design of cities. In particular, Toronto in Canada is used as a model to show ways to tackle agriculture and food issues as design challenges in urban locations. These examples of the connections between food issues and built form have the potential to transform not only food production and distribution; they can also underpin basic assumptions about the spaces and functions required in the design of buildings and urban spaces, and our understanding of the sustainable city.

1. Introduction

“The symbiotic relationship between a productive landscape and the human settlement system is as old as civilization. During the past 200 years, that millennium-old positive relationship deteriorated into a further and further separation of town and landscape.” (Viljoen 2005)

Food is a key aspect of most cultures and has contributed to and inspired many creative aspects of our lives from local cuisine to urban form. Food is also among the most basic, primary needs of mankind. Over the millennia, the activity of satisfying this basic requirement has been one of the key ingredients in the formation and evolution of human settlements and cultures. At the same time it is at heart of current problems regarding the misuse of the natural environment, and is the topic of debate over the value of natural processes. Similarly, cities and urban developments are key aspects of human civilization, and now embrace half (and rising) of all humanity. Cities are also central to humanity’s relationship with the natural world: they are both huge polluters and cause damage the natural landscape and environment, while on the other hand they offer perhaps the least damaging patterns of land use to enable the huge human populations that now exist on the earth to continue to thrive.

In the past, when transport options were limited and the technology of preserving food was less developed, there existed a very close link between the forms and patterns of cities and towns and their food supply systems which were largely regional. However, since the industrial revolution, growing fruit and vegetables within or close to urban areas has been largely eroded, particularly in western nations. A trip to the urban grocery store will produce a feast of vegetable, fruits and meats from thousands of miles away, made affordable by heavily subsidized transport and often underpaid third world labour. Large-scale industrialized agriculture has become a specialized rural activity, and the distances to market have become long and reliant on cheap transport and preservation techniques.

Now that we are struggling with the implications of building more sustainable and more compact cities, what are the implications of food production within the city on built forms and patterns?

2. Urban Food Production

Over recent years a growing consensus has formed that sustainability within an urban context should mean a more densely populated environment, moving away from suburban development and intensifying land use to accommodate more people, reduce transport and build multifunctional and well-integrated communities (Farr, 2008). At the same time, food security is becoming a central concern. Long-distance transport may no longer be possible due to diminishing oil supplies and the impact of climate change. There is also an increasing awareness of the health benefits of local fruits and vegetables that do not require artificial methods for preservation and ripening and the desire for more natural methods of food production.

Growing food within an urban or near urban rather than exclusively rural environment can reduce the need for industrialized production, packaging and transportation of foodstuffs to the consumers who dwell in the city. It can also act as a focus for urban community participation and engagement in a practical as well as cultural activity. Movements such as community agriculture, farmers' markets, the 100-mile diet (http://100milediet.org/) and Slow Food (www.slowfood.com/) put local food supply at the heart of urban sustainability. They encourage us to consider ourselves co-producers, not consumers, and in this way to engage in the many aspects of the food supply process. Reconnecting cities to their food systems is now emerging as one of the core components of more sustainable urban settlements.

As the meaning of sustainability widens to embrace net-zero-impact living, the question of net-zero-impact food-supply chains for urban residents becomes directly relevant to the way we design and plan our built environment, so as to "make edible landscapes" (Batt & Kongshaug 2005). These pressures are likely to lead to a need for more locally produced food, including production within cities. So, how are we to reconcile increased urban populations and densities with land use for food production? How can we integrate food production into dense urban areas?

The link between the design and planning of the built environment and its food systems is an emerging area of study, reflecting a new awareness of the importance of food and the agriculture sector in the functioning of cities and communities. The alternative-food movement is just beginning to recognize the possible contributions that designers and the design process can make to the food supply chain; it has not yet tapped the potential that architects and planners can bring to the reintroduction of food systems into urban space. Recently, this subject has begun to attract significant attention and is gaining recognition among the world of architects and related professionals of the built environment, as well as within alternative food movements.

3. Toronto

A series of speculative design proposals in Toronto are described below to illustrate the potential for food production within the city. Toronto, with a population of 2.5 million has an ecological footprint about 200 times its actual land surface area, and almost a third of this is due to the food supply to the city, often from distant suppliers all over the world. Yet it has been estimated that about 22% of the land area, about 15,000 hectares, of the city could be used for food production (Wilcox et al, 2007). These are vacant sites, underused waste land, roof tops, and yards. Also, Toronto's ravines offer possible agricultural land that could be put to productive use. This land could be used to feed over half of the city population, and could create a 1 billion dollar industry.

Proposals by Chris Hardwicke for Ravine City and Farm City (Wilcox et al 200&) integrate visionary ideas for an urban ecosystem of collective housing that restores and enhances the ravine system of Toronto with a new kind of architecture that would enable the city to feed itself. The Toronto Ravine System is the defining natural feature of the city housing diverse ecosystems and running like fingers through the city. Ravine City creates housing development that runs along the top edge of the existing Toronto ravines, creating artificial ravines by connecting the terraced roof levels of the housing to create a continuous connected ecosystem. The artificial ravines function much like the natural ravines - controlling water flow and regeneration as well as cleaning the air, creating habitat and biomass. This new topographic infrastructure is connected to the natural ravine system and provides public open space. Farm City extends this concept to create agricultural areas integrated into new housing towers. By putting housing and farms in the same building, Farm City creates symbiotic relationships between energy, water and waste. Heat generated from the greenhouses is used to heat the housing units. Biomass from the greenhouses is used for energy. Solar energy is generated from the large glazed surface. Grey-water and compost generated from the housing is used in the greenhouses.

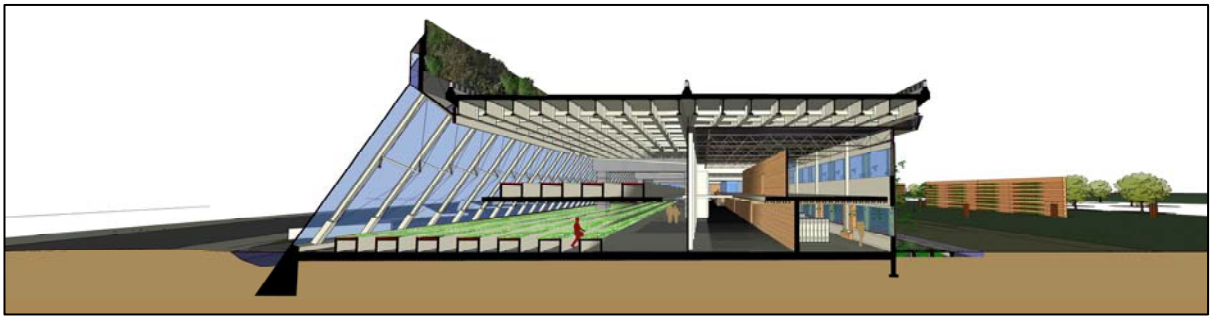

Figure 1: The Gardner Expressway Agriculture Centre

By creating living and growing space in a dense vertical format these proposals reduce the need for sprawling suburbs, reduce food travel distance and create a living architecture that is part of an urban ecosystem.

One fruitful area of research may be the use of undervalued or waste spaces in the city and its potential for community food production. The Gardiner Expressway, a highway overpass that slices through Toronto separating the city from Lake Ontario, includes a raised section. This provides the location for Andy Guiry's project (Figure 1), which investigates the possibility of situating productive greenhouse spaces below a raised highway, utilizing the side facing south to capture sunlight and the heavyweight structure of the highway for thermal mass to store the captured heat. Other features of the project include the reuse of

wasteland adjacent to the highway for additional productive land, and the integration of educational facilities and a commercial space that sells garden supplies in addition to food and plants produced in the large greenhouse. Adding to the sustainable agenda for this project, small turbines were conceived for the median strip along the highway to generate electrical energy for the building through the wind from cars passing along the expressway. Materials proposed for the building were to be reused components from nearby wherever possible.

This concept has the potential to be implemented below many raised highway structures with unused, or underused land below.

Figure 2: Fort York community food centre

A second project, looking at underused land and waste material reuse, concentrates on how community development can be focused on food issues. Jordan Edmonds' community food center not only acts as a transitional bridge between housing and park space but also features reused existing structures and includes a farmers' market, community gathering spaces, bicycle paths, greenhouse structures for food production, and a community garden (Figure 2). His design is anchored in the history of the site, which was once a neighbourhood of icehouses and slaughterhouses and had a river running by (now buried). The project is a prototype for future urban landscapes that would be focused on creating a sense of community around the need for food production. It aims to enable the community to embrace food production through provision of growing spaces, both internal and external, preparation spaces, storage, sales space, all facilitating community participation and education in the processes.

The "Unzone" project by Nicholas Seed's takes some of the same ideas but integrates them into one structure. The project proposes the integration of cooperative housing, commercial, retail and community growing spaces all in one building. It is envisioned to be both a center of the local community, and co-op housing, combining adaptive reuse and new construction. The project site is a former office building in a residential area between the University of Toronto and the central business district. The proposals are for an outdoor farmers' market, an indoor market, garden plots, an orchard, mushroom growing in the basement, and rooftop green-roof gardens and greenhouses for multi-season food production serve the larger community.

Figure 3: Community food education centre

There is a need for projects of this kind to act as pedagogical tools, connecting urban Toronto dwellers with the food they eat, and providing educational opportunities for the community. A proposal by Victoria Dimitrieva proposes a teaching and a productive greenhouse/community space, strategically located near

downtown Toronto in a neighbourhood of residential lofts and co-op apartments along a linear strip of green space that could provide for allotment garden plots across the street from the community building. The long southern exposure of the lot efficiently uses both vertical and horizontal growing surfaces, with specially designed cylindrical growing surfaces wrapped around structural columns as well as living walls. The north side has community rooms and offices. Solar panels provided energy for water distribution and filtration for the growing surfaces.

A project, by Brad Augustine, adopted a more conceptual approach to teach about the impact of food production on the environment. The goal of this proposal for a high-rise farm culminating in a penthouse restaurant was to demonstrate the size of building and resources needed to grow all the food consumed in the restaurant at the top of the tower. Feeding cattle to produce beef, for example, takes many times the space as producing vegetable. Restaurant patrons would travel in a glazed elevator through the floors of food production: cows, chickens, grain, vegetables, fruit trees, etc. into a restaurant where herbs are grown and the cooking is completely visible. This would provide an experience that was immediate, close, and informative on a very basic level, about the effort and resources involved in food production.

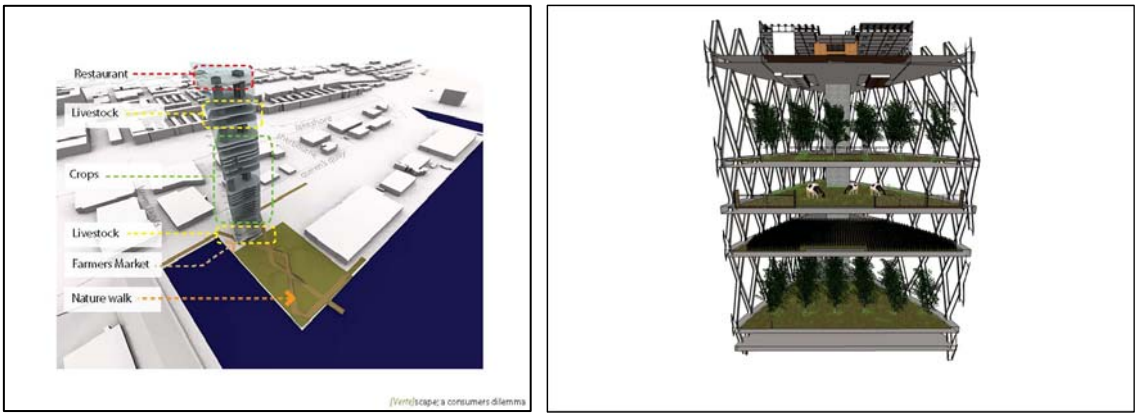

Figure 4: High-rise farm

4. Conclusions

The education of architects, planners and other professionals who impact the design of cities has long failed to address the implications of food supply on city design. As we begin to grapple with the issues of building a more sustainable way of living, food security is becoming a central concern. Food is part of the daily lives of every person in the world, and it is at the core of humanity's functional relationship with natural systems. Agriculture stands at the heart of current problems regarding the misuse of the natural environment; and is the topic of growing discussion over finding new relationships with natural processes.

A greater sophistication in the understanding of the meaning of sustainability and the scale of impacts that issues such as climate change and peak oil will have on food supply are beginning to demand attention. Questions about net-zero-impact food supply chains for urban residents are directly relevant to the way we design and plan our built environment, and therefore how we educate the designers of the future.

The projects discussed above illustrate the serious and diverse nature of possible responses to food supply issues in the city and the potential impact of these issues on the design of the city and its buildings. They start to shed some light on the types of networks of food services that are needed in the city and are the first step in generating ideas for the reintegration of values of community food production leading to change in socioeconomic values. These projects illustrate how providing for a basic human need of food may be possible in an urban context in a way that is socially, economically, and ecologically sound. The next level of thinking about food systems, above specific communities, requires the coordination of these services and segregated landscapes into what has been termed green infrastructure (Benedict 2006). Green infrastructure is essentially a connected network of landscapes within an urban context which is productive in providing for the needs of the people living in that environment. The specifics of how this network functions is dependant on the places that it serves, varying with size and shape of the spaces that are available, as well as the climate, topography, soils, and the needs of the community.

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