Room to Grow: Participatory Landscapes and Urban Agriculture at NYU

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Abstract

Urban Agriculture presents a promising means of addressing at least three critical issues facing cities: food security, ecological health, and community development. As an urban research university with an increasing commitment to sustainable practices, NYU is in an ideal position to contribute to this emerging discipline. Although the neighborhood around NYU's core is uncommonly dense, the University owns several acres of under-utilized outdoor space within this core that could potentially be suitable for cultivation. Techniques such as edible landscaping and distributed gardening further add to the physical potential for urban agriculture on campus. The greatest challenge to cultivation at NYU comes not from the landscape itself, but rather from social forces such as centralized ownership structures and historic preservation. Several options are suggested for conducting further research in addressing these issues.

Introduction

In the last year, New York University and the City of New York have each drafted and begun implementing long-term plans for sustainable growth. *PlaNYC* and *NYU Plans 2031* provide frameworks for dealing with such critical concerns as open space, expansion of infrastructure, carbon emissions, and stormwater management. Yet, like many urban long-term planning efforts, both documents neglect to examine the sustainability of an essential human need - food (Berger, Pothukuchi). The current food system in America, based on processed and packaged foods grown far away from their point of consumption, is currently implicated in a variety of social and environmental crises: epidemics of diabetes and obesity, escalating food prices, widespread food insecurity, and continued reliance on energy-intensive forms of growing, processing and transportation (Patel). Without long-term planning and investment, rising energy costs and a changing climate are likely further destabilize the food system. New approaches are needed that grow and deliver fresh, healthy food to all socioeconomic classes in ways that are ecologically neutral or even restorative.

Urban agriculture, or the coordinated cultivation of food in densely settled areas, is one such approach. Food has been grown in cities in various forms since antiquity, and still thrives today in many places in the global south such as Havana, Shanghai, and Mexico City. Over the last decade, urban agriculture has seen a small but rapidly growing renaissance in United States (Buttery), with many successful examples pointing towards the potential for a large proportion of the nation's produce to be grown within city limits.

As an urban research institution, NYU is in a unique position to begin exploring how urban

agricultural techniques can improve ecological health while providing jobs, food and open space for city residents. This report attempts to highlight the beneficial roles food production might play in NYU's long-term planning. It consists of two parts: a summary of the benefits of urban agriculture and an inventory of the physical and social factors affecting cultivation potential at NYU.

Why grow food in the city?

Urban Agriculture can take a multitude of forms in American cities, ranging from scientifically managed greenhouses to socially-oriented community gardens to multi-acre "agricultural parks" at the urban fringe. How much of a city's food might urban agriculture potentially provide? Utilizing techniques such as greenhouse hydroponics on rooftops or specially-designed "vertical farms", it may be technically possible for even a community as dense as Greenwich Village to be self-sufficient in fruits and vegetables (Caplow). But urban self-sufficiency need not be seen as the primary goal of urban agriculture. An approach that focuses primarily on maximizing yields fails to address numerous interrelated issues with the way food is currently grown and consumed, including inequitable ownership structures and the types of food grown (DeLind). A more holistic approach, striking a balance of ecological, social, and edible yields, can more effectively address a multitude of issues. Examples from across the country demonstrate that it is not necessary to provide a significant amount of food to significantly impact public awareness, ecological fitness, and scientific understanding of urban ecosystems (Myers).

Besides providing food security to urban residents, urban agriculture can act as a catalyst for numerous sustainability goals, such as stormwater absorption, carbon sequestration, biodiversity waste reduction, improvement of air quality, and remediation of contaminated soil and water (Caplow, Barrs, Mankiewicz). These design goals are often mutually beneficial, leading to projects that achieve higher yields in addition to improving urban ecological health. At Zabar's supermarket on the Upper East Side, for example, the store's organic waste is composted and used to fertilize crops on rooftop greenhouses, saving money on waste disposal fees (Ableman). At Open Road Park in the East Village, stormwater from an adjacent school's roof is captured and stored, mitigating the city's combined sewage overflow output while providing a reliable source of irrigation for the park's garden plots.

Equally important and well-documented are the positive benefits of urban agriculture to the communities in which they are embedded. In an analysis of 20 Latino-operated community gardens in New York City, Laura Saldivar-Tanaka and Manianne E. Krasny explain how these

spaces are instrumental in solidifying cultural heritage and intergenerational ties. In the midst of a built environment overwhelmingly controlled by large-scale forces of capital and governance, the community gardens act as a "participatory landscape" that residents can collectively shape in a manner appropriate to their needs. The gardens are often built to reflect ethnic traditions and are used for a variety of formal and informal events beyond gardening.

Such participatory landscapes, in turn, serve as catalysts for nurturing values of citizenship, ecoliteracy, and community participation: Laura B. Delind uses the term "civic agriculture" to highlight this aspect of collective cultivation. These spaces provide the rare opportunity for interactions beyond the familiar roles of producer/seller/consumer (or, at NYU, administrator/teacher/student), and in such spaces, new connections are forged at both the individual and institutional levels that strengthen the community's social health (DeLind).

While potential case studies of the ecological and social benefits of urban agriculture abound, research on these benefits is still in its early stages. An urban agriculture program at NYU would provide an institutional setting for research and advocacy on growing food in the city. Urban agriculture is relevant to a number of academic departments within the University, including the Wagner School of Public Service, the Wallerstein Collaborative for Environmental Education, Environmental Studies, Food Systems, the Gallatin School of Individualized Study, and the Environmental Health Clinic. Research agendas centered around on-campus urban agriculture might cover anything from the effects of urban conditions on plant growth to place-based approaches to ecological literacy to municipal policies that encourage the expansion of civic agriculture. An urban agricultural research program at NYU might also act as a resource and focal point for the dozens of urban agriculture projects already active in New York City.

Room to grow

Is there enough space at NYU to grow food? Where might it happen? How much could be grown? While definitively answering these questions will require further research and the active input of faculty, students and administrators, this section of the paper will attempt to outline the key issues involved in urban agriculture on the NYU campus, and present future possibilities for research and involvement.

For this report, the open space in NYU's core was mapped, quantified and categorized (see fig. 1), and constraints to the use of that space were researched and summarized. Not only an effective research tool, mapping is also a political tool: spatial patterns are reflective of structures of

control (Crampton), which may or may not align with community preferences and ecological well-being. As recent controversies surrounding the renovations of Washington Square and Union Square Parks attest, public space in Greenwich Village is already highly politicized. This analysis intends to contribute to the ongoing local discourse on the use of public space in Greenwich Village by:

- publicly documenting the extent of NYU's open space
- identifying constraints to the equitable and sustainable development of that space, and
- suggesting possibilities for continued research and action.

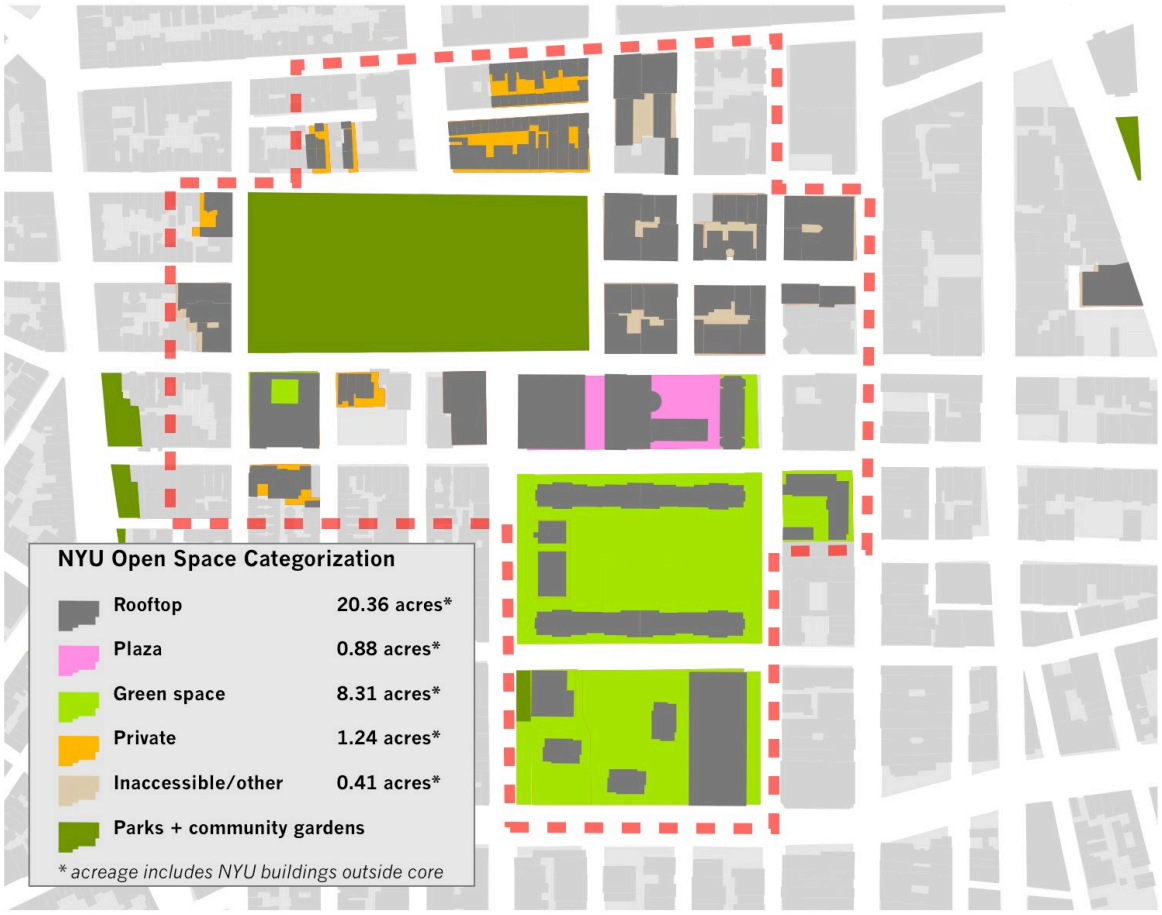

fig. 1. inventory of current outdoor space in NYU core

	Square footage	Acreage
Rooftop	886,691	20.36
Public Plaza	38,479	0.88

Public - landscaped	362,122	8.31
Private	53,897	1.24
Inacessible/other	17,769	0.41
TOTAL	**1,358,958**	**31.2**

Table 1. Categorization of NYU open space uses

To determine the total extent of NYU's open space, a geographical analysis was performed using ESRI's ArcGIS software. A list of NYU-owned properties was queried from New York City's PLUTO tax lot database, and the gross square footage of lot sizes was calculated. Next, this selection was overlaid with a shapefile of building footprints, and rooftop area was calculated. The remaining area was categorized according to current usage, and acreage figures for each use were tallied.

In terms of gross area, NYU owns over 30 acres of open space. Dedicating just one percent of this space to urban agriculture would be enough to generate substantial yields: up to 24,000 pounds of produce in biointensive raised beds or up to 92,500 pounds in a hydroponic greenhouse (Barrs). Yet despite the apparent abundance of open space at NYU, securing even 0.3 acres to support cultivation might prove exceedingly difficult. To get a more realistic picture of agricultural potential, the physical and social constraints on this open space must be examined.

Environmental and Social Factors

The successful cultivation of food in cities demands innovative approaches that go beyond merely shrinking and intensifying rural techniques; instead, design for urban agriculture must respond to the unique dynamics of air, soil and sunlight in the urban ecosystem. Several of these factors are worth mentioning in the context of NYU:

- Due to the urban heat island effect, ambient air temperatures are from 2 to 10 degrees higher in cities than surrounding areas (Lehman).
- Urban soils tend to exhibit a number of characteristics that limit plant growth, including low organic content, a variety of organic and inorganic toxins, compaction, high pH, and poor percolation rates (Marcotullio, Lehman).
- The proximity of much of NYU's open space to busy streets increases the likelihood of exposure to de-icing salts, which reduce vegetative biomass and osmotic potential (Cunningham et al.). As a result of these constraints, indoor or raised bed cultivation is preferable.

- In sufficient quantities, air particulates from traffic and other point sources can reduce biomass as well as seed yield and quality (Agrawal et al.). However, since plants absorb nutrients through their roots and not their leaves, soil pollution is a more serious concern than air pollution for most urban crops (Barrs).
- Finally, the height of many buildings in and around the NYU core limits the areas receiving year-round direct sunlight. While full sunlight is preferable for most vegetables, shaded areas can accomodate cultivation through the use of heliostatic mirrors or selection of shade-tolerant species including mushrooms and microlivestock.

While it is important to understand the above physical considerations when growing food in the city, perhaps the most essential design constraints concern the dynamics of the urban ecosystem's keystone species: *homo sapiens*. More than any physical force, it is the influence of human factors - social norms, laws and regulations, and ownership structures - that ultimately determine the relationship of agriculture to the urban core. Particularly relevant in this context are the forces that control public land. Common spaces have historically been managed in a variety of ways. In smaller, more tightly-knit communities, informal management regimes based on mutual trust predominate (Lee). But as urban growth puts more and more demand on these spaces, there is a tendency to for them become managed centrally (Lee), although not necessarily more effectively (Staley). In the last hundred years, this consolidating tendency has been manifested by centralized planning authorities. These structures, arising from government and other large institutions, tend to neglect the qualitative benefits of public space in favor of easily quantifiable ones. As a result, public space is often employed as a vehicle for economic development rather than seeking to maximize social well-being (Van Deusen).

Like most communities, Greenwich Village exhibits a mix of planned and emergent forces governing the public realm: individuals, local businesses, corporations, community groups, numerous academic and administrative departments within NYU, and several municipal agencies. Open space in the Village is highly contested, with many conflicting opinions amongst these various stakeholders over how space should be allocated. Local actors such as community boards, block associations, and non-profits exert some influence over the programming and design of public land. However, the final decisions about public space are not made democratically but through the hierarchical structures of city agencies such as the Departments of Transportation and Parks and Recreation. The situation within NYU is similar: while students, academic departments, and Village residents have an ostensible role in the University's planning process, land use decisions are ultimately made by the office of Strategic Assessment, Planning and Design. Consequently, participatory landscapes - spaces that are planned and created by a

community's residents - are now virtually absent in and around NYU. Even Washington Square Park, historically the most democratically-controlled space in the area, is currently undergoing substantial renovations over the vehement objections of many in the community (Sullivan).

Further complicating this lack of democratic ownership structures are counter-forces that inadvertently stifle innovation. The dominant response by community groups to perceived encroachment of public space is often preservation of remaining space. For instance, due to community pressure, NYU has pledged to replace any public open space it owns "use-for-use" under any future redevelopment. If a playground is removed to build a new residence hall, for example, NYU must build another playground of equal size somewhere else on campus. Meanwhile, one of the largest areas of open space on campus - the 7 acre super-block encompassing Silver Towers, the Morton Williams grocery store, and the Coles Sports Center - is currently undergoing hearings for NYC Landmark designation. If landmarked, alterations to the existing landscaping would be severely restricted. While these and other preservation efforts have been somewhat successful in mitigating the privatization of public space, they present an additional challenge to the cause of urban agriculture: most community members are still unfamiliar with the concept, and are unlikely to immediately understand its value over other, more established uses such as passive recreation and playgrounds.

Cultivation Options

The above analysis has suggested that the quantity of open space at NYU is not a significant obstacle to urban agriculture on campus. Physical constraints, such as lack of sunlight and contaminated soil, can be accommodated via design choices including species selection and raised bed or indoor cultivation. Instead, the largest constraints are social pressures regarding the use of public space. These pressures have two general sources: centralized planning offices aim to make public space multifunctional and revenue-generating, while community groups seek to preserve existing uses over novel ones such as growing food.

Given these sociopolitical factors, urban agriculture projects that require the exclusive use of any amount of public space are likely to be fiercely contested. To avoid this conflict, two strategies appear to be relevant:

- seeking projects that integrate with the existing forces affecting open space, and
- seeking sites that currently aren't part of the public realm.

Several viable techniques fit into one or both of these criteria.

Rooftop cultivation doesn't occupy existing public space, and therefore does not conflict with other community priorities. Rooftops are an ideal location for greenhouse hydroponic agriculture, the extremely high yields of which could potentially provide a significant source of food for NYU's dining halls or a local CSA. Greenhouses are well-suited to integration with other sustainability goals for rooftops such as rainwater catchment and photovoltaics (Caplow). However, hydroponic agriculture is a highly technical operation and requires a specialized staff. This, coupled with the less accessible location, significantly limits the participatory nature of this form of urban agriculture. For rooftop cultivation to become feasible, research needs to be conducted on the structural integrity and sunlight availability of potential rooftops, and University policies must be revised to allow for student and faculty access.

Edible landscaping provides a means of preserving or enhancing the existing functions of open space while generating a (somewhat less substantial) yield. Fruit trees and berry bushes can be planted along streets and in plazas, while non-destructive vines such as temperate kiwi can be grown on the sides of buildings. Currently planted areas can be redesigned as edible forest gardens, a permaculture technique that replicates the ecological niches of a forest while maximizing edible and medicinal yields. An ongoing program of maintenance and harvest must be considered in the design of any edible landscaping to prevent issues such as falling or rotting fruit.

Distributed gardening is an approach that leverages centralized knowledge and resources to encourage individuals to grow food in semi-public and private spaces. This technique is highly democratic, giving community members a degree of agency over the food system, but does not require any public space to implement. Recent municipal efforts such as San Francisco's Victory Gardens 2008 and Mexico City's Backyard Agriculture Program have begun experimenting with distributed cultivation, although both are too new to discern their success rate. At NYU, such a program could provide community members - students, administrators, faculty, and Greenwich Village residents - with the materials and training to grow in residence halls, offices, apartments and balconies. Research would need to be conducted on best practices for microcultivation, and a comprehensive outreach program would need to be developed to attract participants. Yields from such a program would depend on a variety of factors, including the amount of interest, participants' previous gardening experience, the spaces that are cultivated, and the materials and growing techniques disseminated by the University.

Cultivation Technique	Advantages	Disadvantages
Intensive Rooftop cultivation	High yield. Proven as a technology, innovative as a policy. Potential revenue source for University.	High initial investment. Few opportunities for community involvement.
Edible landscaping	Allows for other uses on same space. Relatively inexpensive.	Low yield. Issues with buy-in, maintenance and distribution of produce. Potential contamination hazard if not grown in planters/raised beds.
Distributed gardening	Highly participatory. Relatively low investment. Requires no public land.	Difficult to estimate yield. While many people involved, less opportunities for interaction
Community gardening	Highly participatory. Builds community connections. Low-cost.	Low yield. Very difficult to find suitable space. Less innovative.
Off-campus minifarm	Yield can be low to high depending on goals. Easier to find space off campus. Opportunities for developing connections with city and surrounding community.	Low visibility to campus community.

Table 2. Summary of benefits and drawbacks of several urban agricultural techniques

Conclusion

Urban agriculture has the potential to provide many mutually enhancing benefits - not just for the goals of urban sustainability, but for public health and community development as well. Yet the adoption of urban agricultural techniques in Greenwich Village is hindered by significant social pressures to maximize the economic value of public space and preserve existing functions. With further evaluation, techniques such as edible landscaping and distributed gardening may prove to be viable footholds for introducing urban agricultural techniques into this dynamic cultural ecosystem.

Yet even if successful, these techniques would exist at the margins of a landscape that is fundamentally heterotrophic and inequitable. In the long term, developing a more ecologically and socially robust built environment will require reconceptualizing the way public space is managed,

and producing more than a token amount of food within city limts. New models are needed that combine the financial resources and design expertise of centralized planning offices with the community agency of participatory landscapes. Meanwhile, the development of a sustainable food system entails much more than merely growing it (Barrs, DeLind); further research is needed into techniques for processing and distributing the yield of urban agricultural projects in ways that are ecologically restorative and socially just.

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