

EATING ECOLOGIES: INTEGRATING PRODUCTIVE ECOLOGIES AND FORAGING AT THE LANDSCAPE SCALE

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This paper explores a fundamental shift in urban agriculture based on a model of productive urban ecologies and cultural practices of foraging. The first part identifies the extent and growth of urban foraging as a significant yet largely unrecognized cultural practice. It summarizes the findings of ethnographic research on urban foraging in Syracuse, NY, as well as a multi-city study conducted by the USDA Forest Service. The result is a typology of urban ecologies and a narrative of the spatial practices of appropriating often marginal spaces of advanced capitalism (vacant lots, brownfields) as well as de-commodified spaces such as parks or rights-of-ways. The second part focuses on design strategies for responding to the challenges and opportunities for urban foraging and productive ecologies. Since foraging is a dynamic and often transgressive practice, crossing boundaries of public/private property, as well as conceptual ones (culture/nature, cultivated/wild) it serves as a provocation for new ways of conceptualizing urban spaces, ecologies, urban agriculture, and design. Case studies and design proposals for Syracuse, NY and New York City provide a set of strategies for re-describing the potential edible ecologies of urban landscapes and intervening in shaping those novel ecologies. It outlines a paradigm shift in design and planning thinking that works with the provisional tactical practices of foraging necessary to shape the emergent nature of new urban ecologies. These productive, edible ecologies integrate urban agriculture with critical landscape systems and re-localize urban metabolism in fundamental ways.

1. Introduction

In the short span of two decades urban agriculture has significantly transformed the fundamental notion of the city, inverting the urban/rural dichotomy of the global north by inserting food production-- practices normally relegated to areas outside the city--into vacant lots, parks, alleyways, rooftops, and practically every type of urban space. Regardless of the scale of these efforts, urban agriculture effectively reimagines the city as a productive system structuring flows of nutrients, water, labor, knowledge, capital, and all the dynamics involved in food systems. While this is a remarkable achievement, urban agriculture relies primarily on an agronomic model that requires significant inputs of physical resources, labor, capital and knowledge to radically transform urban conditions.

An alternative model for the productive city and one that is ultimately complimentary to the agronomic model of urban agriculture starts with the recognition that there are already ecological processes at work in the urban landscape producing a diverse array of edible plants. Using an urban ecological model breaks down the urban/rural dichotomy even further to redescribe the urban landscape as a mosaic of hybrid and novel ecological systems. In addition, an increasing number of people are already eating from the unique plant communities of urban ecologies, gathering a great diversity of wild edibles and "weeds" through practices of foraging.

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An initial glimpse of the potential significance of this shift is suggested in the excerpt below from the author's field notes taken during a project to document the production metrics of community gardens in Syracuse, New York (Figure 1).

Met with the three Bhutanese gardeners at 7:00pm for follow-up interview

When I got there one of them was in the lot behind the back fence and she was harvesting Betu and other "weeds." The house is vacant so the lot was overgrown. She came back into the garden through a gap in the chain link fence carrying an armful of greens!

We continued with the interview. They showed us the different "weeds" they harvest (phonetic translations):

Betu – lambs quarters

Palungi – pig weed, they compare it to Swiss Chard

Kali Sag – looks like nightshade (Kali=black)

Kangi Sag – purslane

Karela (?) –

Jaringo -- looks like Pokeweed, they must cook it, I know the berries, at least, are poisonous.

We asked where they get these weeds, vacant lots? "Yes," wherever they find them around houses, or vacant lots.



Figure 1. Bhutanese gardeners in Syracuse, NY, with greens foraged from vacant lots behind the community garden.

This incident revealed the fact that the gardeners were gathering more fresh greens from the vacant lots and sidewalks of the neighborhood than were being produced in the compost-filled raised beds that had been built by the coordinated effort of several non-profit organizations. This revelation was

also a provocation to follow the very elusive yet extensive practices of foraging by "New American" refugee groups as well as many other urban foragers representing a diverse range of ethnic, income, and other social groups. This growing cadre of urban foragers are doing the ground work of discovering wild edibles and "weeds" in unique ecological niches on the verge of roads, in the cracks of sidewalks, hidden in plain sight in the matrix of lawns, or discovered in public parks. Through this very direct engagement they are building new knowledge of urban ecosystems, constructing new values, and staking out new potential for the productive city. Taken together the model of urban ecologies and the cultural practices of foraging offer a conceptual framework as well as immediate practices to reimagine the urban landscape as a mosaic of "productive ecologies."

1.1 Goal

This paper explores the reciprocity of foraging and productive ecologies for designing sustainable urban food systems in two parts. It begins at the ground level with an ethnographic study of foraging practices in order to establish baseline knowledge of who is foraging, how much, why and where. These narratives of the social, ecological, and spatial practices of foraging help to map a typology of urban productive ecologies as well as define the issues and challenges associated with them. The second part responds to these challenges and potentials with a series of design and planning propositions ranging from small-scale site-design to larger landscape scale strategies. It is based on a paradigm shift in ecological thinking that views urban ecology not as a disturbed version of ideal natural systems, but rather emergent, hybrid systems that produce novel multifunctional ecologies. Seeing the city as a mosaic of potentially edible ecologies also requires a paradigm shift in design and planning thinking that works with the provisional, tactical qualities of foraging necessary to shape the emergent and indeterminate nature of these new urban ecologies.

1.2 Context and Methods

The overall approach is to ground design and planning of edible urban ecologies in and understanding of the cultural practices of foraging, to learn from these vital practices as they provide very particular knowledge and direct engagement with urban ecologies. Contemporary ecological discourse that focuses on hybrid and novel urban ecologies is applied to redescribe urban landscapes and the potential for new design interventions in these spaces and systems.

The first section of this paper summarizes a multi-year effort to document foraging practices in Syracuse, New York, as well as a collaborative effort to share protocols and results with a multi-city study conducted by the USDA Forest Service in New York City, Philadelphia, and Seattle. This on-going study by the USDA is perhaps the most extensive documentation of urban foraging to date. Using mixed methods of research, including interviews, focus group meetings, and "foraging walks," information was gathered on who forages in these urban landscapes, what they forage, their motivations, and the types of places and urban ecologies that are critical for their practice. While the primary focus in Syracuse was on New American groups, specifically Bhutanese, Burmese, and Congolese, other foragers were identified through snowball sampling as well as contacts from engagement in community-based projects. The Syracuse sample includes people ranging in ages from nineteen to eighty-two, different neighborhoods, a diversity of ethnic groups, and a variety of income levels. Another part of the sample was drawn from the students in the College of Environmental Science and Forestry (ESF) part of the State University of New York (SUNY) system. This research is also part of on-going participation action projects with New American groups in

Syracuse for developing community gardens and the Salt City Harvest Farm (SCHF), a community farm at the urban edge of Syracuse. This project-based and community-engaged scholarship approach helps to establish a strong working relationship and shared purpose with New American groups.

The primary context of the study, Syracuse, a city in central New York, with a population of 150,000, is a rust-belt city with a declining industrial base, aging infrastructure and high rates of poverty. In 2009-2013, 34.6% people were living below poverty level in Syracuse (US Census Bureau 2014). The industrial history of Syracuse with waves of immigrant labor helped to create a culturally diverse city and that diversity continues to grow. As one of the target cities for refugee resettlement, Syracuse offers low-cost housing and an infrastructure of support agencies for New Americans (Onondaga Citizens League, 2013). This context of a post-industrial landscape with increasing areas of vacant land has implications for foraging that will be discussed below. The medium size scale of the city, the emerging cultural diversity, and new ecologies of this formerly urban landscape (Czerniak, 2013) also present new opportunities for developing models of sustainable urban systems (Marris, 2011; Tumber, 2013). In particular the city was a leader in developing one of the first urban forestry plans in the country, which begins to re-describe the urban landscape from a systems perspective (Nowak and O'Connor 2001).

2. Part I: Foraging Practices in Productive Ecologies

Foraging crosses not only physical but conceptual boundaries, making it difficult to define. What is offered here is a provisional definition of foraging that is qualified and expanded by the experiences and language used by the people engaged in the practices of foraging. These practices extend across a spectrum based on degrees of intervention in ecologies. At one end of the spectrum is minimal intervention where people gather just what they find from an existing system while at the other end of the spectrum are the intensive alteration of the components of soil, water, structures and other systems found in gardens and agricultural plots. However, in between foragers intervene in landscape processes to varying degrees such as harvesting only a percentage of a species, spreading seeds or pruning vegetation. Harvesting in some cases actually helps to propagate certain plants. It is the intention of working with existing systems that distinguishes foraging from the model of gardening or agronomy. Foraging is also a temporal strategy based on flexible use rather than fixed land tenure. As a result it often manifests as a temporary overlay on existing productive spaces – foraging between rows of a managed orchard or garden for example.

2.1 Who is foraging and why?

This elusive practice also makes the task of finding foragers a difficult one. Yet, a multi-city study of urban foraging conducted by McLain et al. (2014) reveals foraging as a widespread and increasingly popular practice engaged by people across economic levels, ethnicities, and ages. This range is also evident in the sample of foragers interviewed in Syracuse which includes a retired engineer who forages wild grapes (*Vitis vinifera* L. subsp. *Sylvestris* Hegi) and sells them at the regional farmers market, someone who leads foraging walks for the local Slow Food chapter, and a Korean grandmother foraging for the family restaurant.

Until recently there has been little to no recorded data of the numbers and types of plants being gathered in cities. However, documentation of this study shows an extensive list of edible species. A preliminary inventory in New York City revealed over sixty varieties of plants and fungi are being gathered, whereas in Seattle, interviewees report over 400 species gathered (McLain et al., 2014;

Poe, et al., 2013). In Syracuse, the New American refugee groups alone, find a dozen types of plants familiar to them from their original home landscapes and subsequent refugee camps in their otherwise unfamiliar surroundings of a North American city.

The motivations for foraging are as diverse as the plants found and groups engaged in this practice. In all cases foraged food is highly value through different discourses including those of health, ecological sustainability, culinary performance, or cultural identity. Foraging by students at SUNY ESF, for instance, is linked to broader environmental concern for reducing carbon footprint and performing certain bonds with nature. Foraging has also become a highly valued and popularized practice in the local food movement. Some of the world's leading chefs such as Rene Redzepi of NOMA in Copenhagen advocate foraging and orient their cuisine around wild harvests. However, in a Korean restaurant in Syracuse the Grandmother of this multi-generational space forages year-round for an extensive variety of greens and ferns, yet all of the wild greens in the banchan bowls go unmarked on the menu. Foraging greens is such a common practice embedded in Korean culture that it does not need a premium designation.

In no instance did the research find that foraging was devalued as the last resort for subsistence. While this may be a result of the populations sampled it does suggest an important corrective of the perception of foraging as a marginal practice that people would engage in only if they were poor and starving. Even for the New Americans living in parts of Syracuse identified as "food deserts," foraging aligned with values of cultural identity and health rather than compensating for hunger or poverty. The most frequent and abundant type of plants that New Americans forage are "greens," particularly lambsquarters, American polkweed (*Phytolacca americana* L.), pigweed (*Amaranthus palmeri*, S.Wats or *A retroflexus* L.), and purslane (*Portulaca oleracea* L.). Most of what they gather is simply not available in the grocery stores. Plants such as lambquarters, which wilt very shortly after harvesting, would have a very brief shelf-life in a grocery store. According to New Americans the few culturally specific varieties of plants found in the one grocery store in the neighborhood or in the multiple small ethnic markets, are not fresh, or often frozen.

Those interviewed also emphasize the healthiness of the fresh foraged greens. Stinging nettle (*Urtica dioica* L.), or "sishnu" as Bhutanese refer to it, has multiple medicinal uses for maintaining general health but also as a cure for digestive problems. As one Bhutanese man explained, when they were in the refugee camps, they had limited access to doctors or hospitals and "these plants were our medicine."

2.2 The Spatial and Ecological Discourses of Foraging

Foraging as spatial practice seeks edibles anywhere a plant or mushroom will grow. In an urban landscape this means finding edibles in the cracks of sidewalks and median strips, as well as creek corridors, park woodlands and lawns, vacant lots, yards, and institutional grounds. Searching for plants in these spaces inevitably crosses physical and social boundaries and blurs the distinctions between private/public spaces. This crossing reveals conflicts as well as the potential for new relationships to place, ownership, and common use.

Foraging as an ecological practice also transcends the dichotomies of urban/wild, or culture/nature. In the urban context vegetation is as much a human construct – managed or neglected, invasive or ornamental -- as a natural process (Pickett et al., 2001). Instead of seeing these urban spaces as degraded natural systems, new paradigms of ecological systems acknowledge that there is no ideal state of balance but rather more dynamic processes of disturbance, adjustment, and change in which humans have played a significant role (Ellis, 2014). The management practices of private property, institutions, parks, and open spaces maintain certain ecological process while suppresses others

(mowing, weeding, etc.) and these spaces in turn reproduce and reinforce certain values (Pickett et al, 2001; Del Tredici, 2014). Human interaction with ecologic systems -- altering species distribution, hydrologic patterns, soil compaction, and micro as well as global climates-- produces ecologies characterized by their heterogeneity and multifunctionality (Ellis).

In Syracuse and cities across the rust-belt, the economic downturns, loss of industry, and shrinking tax-base that results in abandonment and cut-backs on maintenance represent regime shifts in both social-political and ecological systems. From an ecological perspective, the regime shift in the social/economic systems opens up opportunities for the emergence of new ecological systems. The vacant lots which are emblematic of this process, are actually quite full in terms of soils with latent seed banks and emergent vegetation processes, as well as toxins. Ruderal species, plants with adaptive strategies that enable them to colonize disturbed sites, quickly reclaim the formerly urban spaces of vacant lots, channelized waterways, and decaying infrastructure of sidewalks, walls, streets, roofs, and fences. The scale of this new urban ecology can be significant as in one estimate of Detroit, 40% of the total land area has been abandoned and reclaimed by "spontaneous vegetation" (Del Tredici, 2014). As these processes occur at different degrees and intersect with different sites at different scales new, and diverse ecologies emerge. Foraging leads the way in directly engaging and finding value in these unique, emerging patterns.

The intersection of these social-political and ecological regimes produces a rich mosaic of urban spaces for foraging. A typological analysis of the diversity of foraging spaces in Syracuse includes vacant lots, public spaces (parks), rights-of-way (including sidewalks), institutional grounds (schools, campuses, hospitals), cemeteries, natural forms/elements (creeks, steep slopes), and interstitial spaces (cracks, medians, boundaries). Each type varies according to spatial characteristics (scale, etc.), as well as degrees of access and management (or lack there of) practices that influence plant ecologies (mowing regimes, soil compaction). For example, cemeteries are spaces favored by many groups because they allow a high degree of access similar to a public park, as well as a diversity of plants. The long-term land tenure of a cemetery and pastoral aesthetic favor mature trees and shrubs and undisturbed soils with extensive mycorrhizal development.

2.2.1 Parks and Public Spaces as Edible Ecological Infrastructure

In Syracuse, as in most North American cities, the urban park system provides an infrastructure for larger scale and connected spaces dedicated to ideas of recreation and representations of nature. Since many parks were established as a counter narrative to the conditions of the industrial city, they protect open, relatively uncontaminated areas, and only herbicide use impacts the quality of edibles. Foragers also use park spaces for gathering mushrooms, fruits, and nuts, as well as sources for "invasive" edibles such as garlic mustard (*Alliaria petiolata* M.Bieb.) and goutweed (*Aegopodium podagraria* L.). In Syracuse, the parks preserve remnant and significant landforms and waterways, including drumlins with their particular soil profile.

However, the park system is also shaped by the aesthetic ideology of a pastoral landscape that provides services of recreation, but not products such as food (Byrne and Wolch 2009; McLain et al. 2012). When they were originally planned, pastoral urban parks served as a refuge from the productive industrial city. Even though new attention to the ecological functions of open spaces has expanded the role of parks to provide multiple services such as stormwater retention and reduction of urban heat island effect, their potential as productive food spaces is still unrecognized and often prohibited. Syracuse city ordinances are typical in their prohibitions for anyone to "peel, cut, deface, remove, injure or destroy... pluck, break, trample upon or interfere with... take, dig, remove or carry away" any trees, shrubs, grass, or flowers in the parks (Syracuse Municipal code, Sec. 17.8).

2.2.2 Foraging the In-between: Interstitial Spaces

sidewalk cracks, property boundaries, median strips...

Access: high degree, ambiguous ownership

Ecology/design: edge zones, invasives



Figure 2. Typology of interstitial spaces across multiple scales.

The interstitial spaces, the spaces between socio-political boundaries of property and land uses, as well as the edges between ecological zones, are critical sites of foraging (Figure 2). It is the very ambiguity of these spaces between authorities that create openings for behavior that is considered transgressive in most contexts (Galt et al., 2014). At the margins of the community garden or Salt City Harvest Farm at the urban edge, maintenance regimes (mowing, plowing, weed whacking) end, and weeds find space to flourish. At these margins, New Americans find stinging nettle, black nightshade (*Solanum nigrum* L.), and more lambsquarters. Around acres of Syracuse's Inner Harbor area, an extensive brownfield once known locally as "oil city," a chain-link fence supports a spontaneous linear vineyard of wild grapes. For foragers interstitial spaces allow them to gain access to plants growing there, yet they can quickly retreat back to a safe public or private space. The interstices also operate across scales ranging from the cracks in the sidewalk to the borders between land uses and the successive and complex edges of urban development.

3. Part II: Designing Edible Ecologies at the Landscape Scale

The foraging practices discovered in Syracuse aligns with studies in other North American cities (McLain et al. 2014, Poe, et al. 2013; Wehi and Wehi, 2009) to reveal the diverse values and its deep relational ties to nature, community, and place. Yet, despite these values and the growth in popularity, foraging remains a surreptitious, tactical operation that transgresses property boundaries and is often prohibited by management policies and/or subject to varying degrees of tolerance. The conflict between property management and the common practices that more or less transgress or trespass is just one of several tensions that foraging invokes. Foragers consume vegetation, potentially putting pressure on plant communities, and yet they are also knowledgeable stewards and advocates for protecting these resources. Paradoxically, the very sites that are most attractive for foraging, the interstitial spaces or highly productive ecologies such as wetland, are also some of the most toxic sites – the very processes and relationship that make for productive ecologies can also concentrate toxins. While these ecological and social tensions are at the root of the conflicts

between foragers and land managers, they can also serve to identify important motivations and critical processes at work that can inform and generate change.

The following set of design projects and proposals offer ways not only for resolving conflicts but also for realizing the unique potential of foraging to change fundamental relationships with urban ecology, place, and community. The design approach outlined here is grounded in the understanding of foraging as a set of creative cultural practices that can then be leveraged and extended in new ways to shape urban spaces. This approach is also grounded in the realities of emerging urban ecologies often found in the interstitial spaces of post-industrial landscapes, and infrastructure corridors, as well as conventional managed spaces of parks, institutional grounds, or even the urban farm and community garden.

However, to design for foraging and new urban ecologies also requires a paradigm shift in design thinking. The transgressive and opportunistic strategies of foraging that respond to the dynamics of changing urban ecologies pose challenges for conventional approaches to design, planning, and policy development. For instance, regulating land-based resources is a fundamental practice of urban planning; however, foraging is more knowledge-based and adaptive to changing land-based conditions, emphasizing rights of use rather than property ownership. However, contemporary landscape design theory that embraces systems thinking and engages the novel ecologies of urban sites offers new strategies for meeting the challenges and potentials posed by urban foraging (Marris, 2011; Waldheim, 2006).

The following examples begin with the design of individual sites that provide direct, comprehensible models of productive ecologies for foraging. However, since foraging and urban ecologies involve shifting relationships across multiple sites, it follows that design for foraging need not be bounded by a single site, but instead seeks to develop frameworks that link systems across multiple sites and scales. Working on the institutional scale of the ESF campus provides a model that is then expanded and applied to the landscape scale of the city.

3.1 Designing Comprehensible Systems at the Site Scale

A basic starting point for engaging the complexities of foraging is the design of small-scale sites: the immediate point of contact between people, plants, and place. Working at this scale provides comprehensible models of systems that can then be scaled-up and expanded to a larger urban landscape. Since the vacant lot is such a common space in post-industrial cities such as Syracuse, prototypical designs for this space can then be repeated and multiplied to have significant impact on food access and the ecology of the city.

Instead of seeing vacant lots as representing loss, degradation, and other negative conditions to overcome or transform, foraging practices help to discover the existing and emerging values of these sites that can be leveraged into new designs. Minimal interventions such as adding soil that contains a rich seed bank, selectively removing certain species such as Buckthorn (*Rhamnus cathartica* L.), or establishing varieties of plants that can self-propagate or create favorable conditions for other species, all tend to work with the emergent nature of these sites. Rather than controlling form through typical garden design approaches, here the intention is to "set the site in motion," creating the conditions for change and guiding the indeterminate processes.



Figure 3. Rhama Clinic Forest Garden, Syracuse, NY, with “wild” edibles at initial planting (left) and four years later (right).

The Rahma Clinic garden in Syracuse exemplifies a design for foraging (foraging-driven design). A local non-profit, the Alchemical Nursery Institute, collaborated with the Muslim American Care and Compassion Alliance (Rahma means “mercy” in Arabic) to manage the vegetation succession of this vacant lot that lies adjacent to a health care clinic to create a “food forest.” The food forest concept uses principles of permaculture to mimic in a very general way the layered structure of a forest plant community – canopy, sub-canopy, shrub, herbaceous, groundcover, underground (root crops), and vertical/climber layers. The site continues to evolve as certain plants spread by rhizomes or seeds from birds that find suitable habitat in the garden (Figure 3).

The Rahma Clinic Garden, just is one example of growing popularity of “forest gardens.” The Beacon Food Forest in Seattle or the Edmonton River Valley Food Forest in Alberta, are two of the more well-known projects in this genre. These edible ecologies involve a sprawling, even messy-looking diversity that appears in stark contrast to a manicured lawn or even the conventions of a community garden. However, by framing what many perceive as unruliness within a field of care ordered by pathways, signs, and borders, these sites help to focus public attention the value of these systems (Nasseaur 1995) and re-shape perceptions of aesthetics, functionality, and their social. In addition, these sites offer the opportunity for direct community engagement in the creation and maintenance of the system, as well the experience of eating from these systems, all of which contribute to the understanding how these new urban ecologies work.

3.2 Connecting Sites: The Edible Campus

While small-scale actions on individual sites help to change the texture of vacancy, it is difficult to consolidate the fragmented distribution of vacant lots to create spatial patterns such as corridors or patches of any significant scale that can function as landscape ecology (Forman 1986; Pickett 2001). Focusing on institutional spaces, instead, offers a means of creating these larger-scale patterns. Institutions have already assembled significant land resources and, somewhat paradoxically for foraging, they offer the authoritative control to develop these spaces into edible ecologies. Most importantly they can serve as significant public spaces with varying degrees of access and inclusion.

On the campus of The College of Environmental Science and Forestry(ESF), part of the State University of New York system, student groups initiated a project for an “edible campus” – an overlay of edible ecologies on the existing campus landscape. The goals of this multi-year project are:

1. gradually transform under-utilized spaces on ESF’s main campus into delicious and more ecologically functional habitats
2. create an experiential learning environment for students and visitors that integrates ideas from many disciplines already taught on campus (Green Campus Initiative 2015).

The project reflects the cultural discourse of sustainability, native plants, restoration, and other values one would expect at this environmentally focused college. The initiation and on-going planning and development of the edible campus project involves these groups as well as other stakeholders, including the head of grounds maintenance, director of the Office of Sustainability, various faculty, and interested students. Students in the landscape architecture Food Studio at ESF developed conceptual plans that went through various reviews by stakeholders. The design works with the idea of novel ecologies. The campus already has several such situations: a roof garden originally planted with sedums, which has shifted to a massive field of chives (*Allium schoenoprasum L.*), and an innovative project for the green roof of the Gateway Center, which adapts the plant communities of the regional dune ecology of Lake Ontario to the extreme conditions of wind, sun exposure, and fluctuating moisture episodes of the rooftop. This garden also addresses university administrators’ aesthetic concerns. The Gateway Center roof garden is visually stunning in all seasons, illustrating the concept of how “messy” systems are more acceptable if viewed within ordered frames (Nassauer 1995).

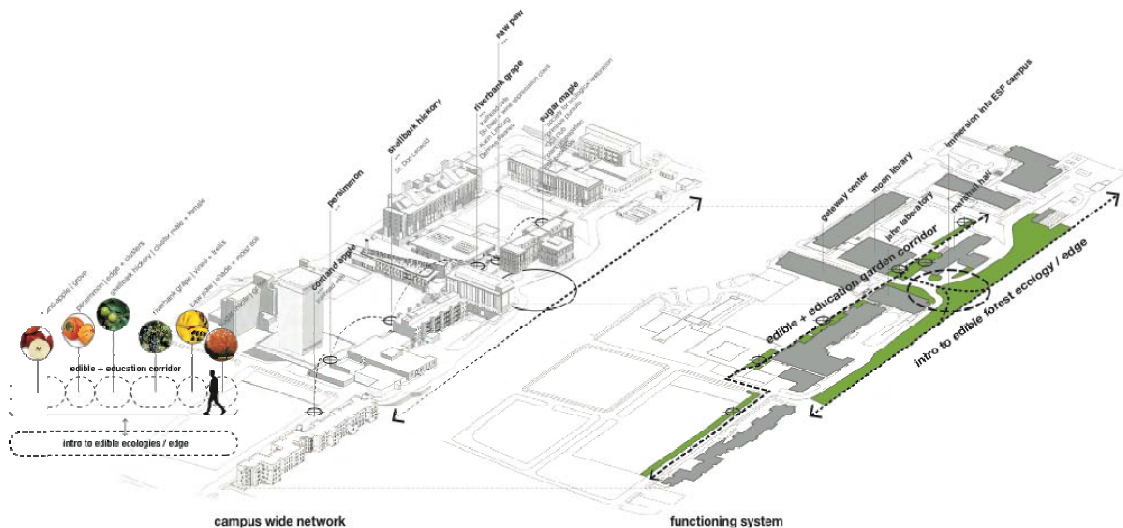


Figure 4. Concept for creating a connected series of edible ecologies along the edge of the campus of the College of Environmental Science and Forestry, Syracuse, NY.

The organizing concept for the edible campus is to develop a corridor along the edge of campus that is adjacent to a large historic cemetery designed by the Olmsted office (Figure 4). This edge is an

interstitial space composed in some sections of mature hardwoods and in others invasive buckthorn, lawn, or meadow dominate. A broken chain-link fence does little to impede the flow of people between campus and cemetery, a space where many students also forage for mushrooms, acorns, raspberries, and other foods. As a corridor, this space links distinctive landforms that define the city, extending from a drumlin on the upper part of campus down to an interstate highway embankment that separates the still-expanding campus from the Southside neighborhood of Syracuse.

The strategies for developing this into an edible foraging landscape involve a sequence of actions – mapping existing plants, clearing invasives, establish new plant communities -- led by student groups, faculty, and the campus maintenance. As it develops the edible ecologies of this campus project will provide a tangible model for linking multiple spaces into a publicly accessible system that can be applied to the landscape scale of the city.

3.3 *Scaling-out: Mapping Foraging at the City Scale*

Working at the landscape scale involves more diverse groups and greater complexities in land uses and intersecting ecologies. The critical knowledge about how these cultural and ecological systems interrelate is gathered from two sources. First, since knowledge of urban ecologies is constructed and maintained through the very act of foraging and resides in the experience of foragers, it is essential that foragers be interviewed and engaged in the process to track patterns of use, intensities, and critical areas. Second, this knowledge must be linked to more conventional land-based mapping and documentation. In Syracuse, GIS mapping is used to identify the patterns of foraging typologies that can be correlated with other demographic and land use layers. Even the mapping practices can be collaborative and open to foragers who increasingly employ social media and smart phone apps to document and share information. For example, In California, researchers with the Berkeley Open Source Food project (BOSF) document wild edibles in the East Bay Area food deserts in a field guide and post current field observations on their iNaturalist project site (Berkeley Open Source Food).

3.4 *Foraging a New Productive Ecology as Urban Infrastructure*

Synthesizing this kind of systemic knowledge and mapping the spatial patterns provide the basis for larger-scale spatial planning that can serve as ecological infrastructure for the city. The GIS mapping of foraging typologies and their distribution across the city provides data that can be integrated with other city planning programs for promoting innovative land use. One such opportunity is to coordinate with the recently established land bank in Syracuse, which has the authority to seize tax-delinquent properties and offer them back to individuals or organizations at below market rates. The land bank is a means of managing the marketplace to make changes in the urban landscape in the absence of strong regulations or public financing. The land bank's Green Lots program provides funding for community gardens, which could be used to acquire and consolidate vacant lots and develop edible ecologies as an alternative to the conventional raised bed community gardens.

At the macro-scale, urban landscapes represent a hybrid of biophysical systems and cultural infrastructure. Transportation infrastructure, for instance, often follows river corridors. These macro patterns can also serve as the framework for developing productive ecologies integrated with urban infrastructures of open space, transportation, water, and housing. This is the objective for a proposal to scale-up urban foraging by creating an edible ecology for the Onondaga Creek corridor in Syracuse. This creek corridor cuts a north/south transect through the city of Syracuse linking open spaces through various neighborhoods of different income levels, race, and ethnicity, as well as the

downtown business and entertainment district. For most of its journey through the city, Onondaga Creek is fenced and forgotten. The fence has removed this riparian zone from park maintenance, and the resulting vegetation succession is rich in edible species including walnut (*Jugans nigra* L.), American basswood (*Tilia americana* L.), wild grape, chokecherry (*Prunus virginiana* L.), raspberry, elderberry (*Sambucus nigra* L. ssp. *Canadensis* (L.) R. Bolli), Queen Anne's lace (*Daucus carota* L.), mugwort (*Artemisia vulgaris* L.), sumac, and nannyberry (*Viburnum lentago* L.).

The proposed design strategy leverages this hidden asset as a resource for the larger system and to encourage significant public engagement with the city's ecological infrastructure. Instead of removing the whole fence, the alternative strategy is to create a varied edge condition that mediates the abrupt fence line, and, in certain areas where slope and water quality permit, realigning or even removing the fence to allow limited access to the creek. Along this more complex edge, a public trail provides access to different foraging potentials. Immediately adjacent to the trail, orchards and mass plantings of popular berry-producing shrubs extend the riparian edge. To compliment this concentration, plants that are more sensitive to foraging pressures are dispersed in less accessible locations requiring more knowledge and effort to forage them (Figure 6).

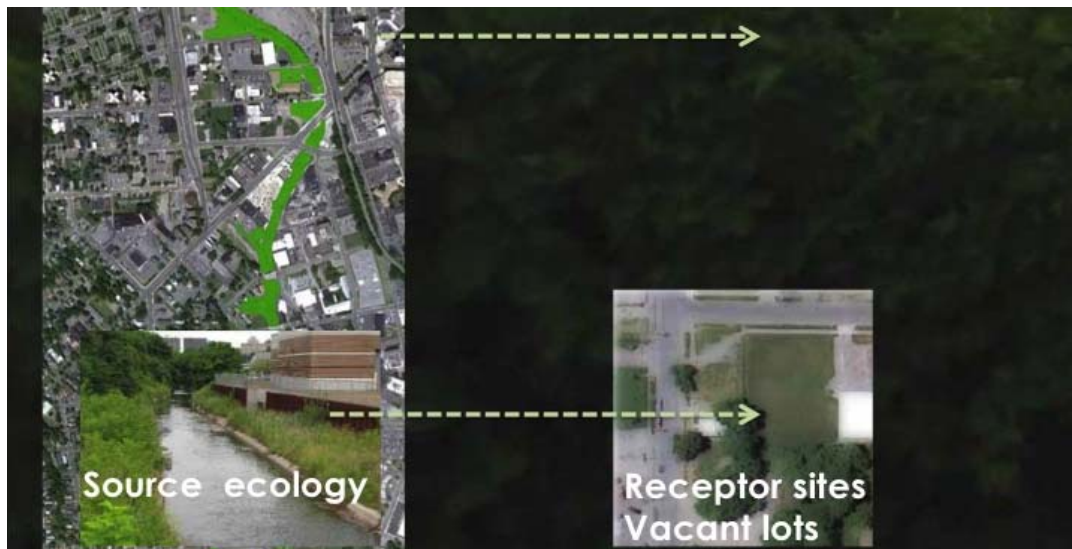


Figure 5. Design strategy for Onondaga Creek Corridor as a productive ecology that provides seed sources for the dispersion of plants through the larger neighborhood (credit: Ella Braco).

Concentration and dispersion also work at the landscape scale. The stream corridor as "source site" provides habitat for birds that then disperse seeds throughout the adjoining neighborhoods that have the highest vacancy rates in the city. To aid this process, the design provides guidelines for organizations (schools, churches, community centers) in these neighborhoods to adopt vacant lots through the land bank program and develop them to serve as "receptor sites." The guidelines help establish the basic conditions for vegetation succession including compost and elements that attract birds, which serve as starting points for novel systems to emerge.

The Design Trust for Public Space in partnership with New York City's Department of Parks and Recreation (DPR) recently proposed a similar concept for a continuous corridor of native plant infrastructure along the Bronx River Greenway. The proposal includes the recommendation for planting edible native species, which diverges from the official DPR policy against foraging in public

spaces. The Five Borough Farm II publication describes this new recommendation for native plant infrastructures:

Native plant infrastructures, including edible species, could be reestablished in New York City's parks and parkland over time by DPR by identifying appropriate areas, researching the preexisting local ecology of each place, and diverting investments to improve the native ecology of the areas. Foraging could be incorporated to a greater extent within DPR maintenance regimes. DPR could explore the potential for designated foraging zones and/or foraging days within parks. (Design Trust for Public Spaces, p. 63)

Using the proposal for Onondaga Creek as a model, students from ESF's Food Studio took these recommendations and developed more specific plans to illustrate how this shift in policy could be implemented in design. (Figure 6)



Figure 6. Design strategies for edible ecology along the Bronx River in New York City

4. Conclusions: Toward Productive Urban Ecologies

Foraging across a diverse typology of spaces offers an expanded conception of the productive city. While urban agriculture has played an important role of reinserting productive functions into urban space, breaking down the dichotomy of rural vs. urban, it still separates out production as a discrete space relegated to vacant lots, rooftops, or raised planting beds. The Continuous Productive Urban Landscape (CPUL) is significant in integrating urban agriculture with the larger landscape systems of the city (Bohn and Viljoen, 2014). The model of productive urban ecologies and foraging compliments this spatial strategy and links it to the emerging ecological realities and cultural practices of urban landscapes.

Foraging as an opportunistic, flexible practice attuned with the emergent and novel ecologies of urban landscapes. The mix of native and exotic vegetation thriving in the urban voids, on compacted soils, within chain-link fences, or in the margins of roads is not the idealized rural nature represented in parks or the Arcadian ideal of pure or even restored nature. Foraging is key to understanding and finding critical values in these hybrid urban ecologies which have been unrecognized or misunderstood. The very challenges that foraging in these places poses for planning and design also helps to focus attention and engage these critical realities. The design approach outlined above advocates a process of learning from foragers, building a knowledge base of not only information about urban vegetation systems but also strategies for interventions. Design, as an on-going, adaptive process, provides flexible frameworks to integrate vital ecological processes and cultural practices into the infrastructure of the city.

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