

Towards a Vision of Metropolitan Agriculture

Abstract

This paper identifies ‘metropolitan agriculture’ as a framework for understanding the relationship between agriculture and cities. It utilizes systems thought to create a lens through which the complex dynamics of cities, agriculture and food systems can be viewed. It then assesses “urban agriculture” and “industrial agriculture,” identified here as agricultural paradigms at vastly different stages of development and efficacy. On a conceptual level, it argues that agriculture is an integral part of the economic, social and ecological landscapes of urban systems and that innovative use of urban resources in support of agricultural processes will facilitate more sustainable urban development. Further, on an operational level, metropolitan agriculture helps provide a template for how best to use those resources in pursuit of more sustainable development.

Introduction

A growing awareness of the socioeconomic and ecological impacts of urban development, combined with the recent upsurge of interest in questions of food systems and agricultural sustainability, underscores the need for research into the linkages between cities and agriculture. Some argue that rapid urban growth has resulted in cultural alienation from the underlying processes by which food is produced.¹ In addition to this alienation, some connect the growth of urban centers, both spatially and in terms of population, to potentially unsustainable increases in demand for food as well as loss of agricultural land in and around metropolitan areas.² Indeed, one commentator laments the agricultural impact of continuous urban expansion in California: “Every day, bountiful fields surrender to big-box stores, fast-food restaurants, and residential sprawl. More than 100,000 acres were paved over in the Central Valley alone in the 1990s, and experts estimate that nearly 1 million more could vanish within a generation.”³ Beyond the lens of these crises, however, what are the ways in which agriculture shapes, and is shaped by, urban development, and how are they linked?

While some recent work brings urban and regional questions more prominently into the food systems discourse and grassroots urban agriculture initiatives continue to grow in number and scale around the world, a clear examination of the relationship between agriculture and cities remains elusive.⁴ What ‘types’ of agriculture best suit the needs and dynamics of contemporary urban life? There are voluminous debates on the methods by which agriculture should be made more sustainable, but these often remain divided disciplinarily and politically, and conspicuously ignore the urban question. Inclusive, practical discussion of how agricultural initiatives and enterprises might be sustainably

¹ McClintock (Nathan) “Why farm the city? Theorizing urban agriculture through a lens of metabolic rift,” *Cambridge Journal of Regions, Economy and Society*, 3 no. 2, 2010, p. 191-207; Lapping (Mark) “Toward the Recovery of the Local in the Globalizing Food System: the Role of Alternative Agricultural and Food Models in the US,” *Ethics, Place and Environment*, 7 no. 3, 2004, p. 141-150

² Ehrlich (Paul) Ehrlich (Anne) and Holdren (J.P.) *Human Ecology: Problems and Solutions*. San Francisco, W.H. Freeman and Company, 1973, 304 p.; Seto (Karen) and Kaufman (Robert) “Modelling the Drivers of Urban Land Use Change in the Pearl River Delta, China Integrating Remote Sensing with Socioeconomic Data,” *Land Economics*, 79 no. 1, 2003, p. 106-121

³ Wartzman (Rick) “Can the City Save the Farm?,” *California Magazine*, 2007, May/June

⁴ Morgan (Kevin) and Sonnino (Roberta) “The Urban Foodscape: World Cities and the New Food Equation,” *Cambridge Journal of Regions, Economy and Society*, 3 no. 2, 2010, p. 209-224; Marsden (Terry) “Mobilizing the regional eco-economy: evolving webs of agri-food and rural development in the UK,” *Cambridge Journal of Regions, Economy and Society*, 3 no. 2, 2010, p. 225-244; Mougeot (Luc) *Agrapolis: the social, political, and environmental dimensions of urban agriculture*, London, Earthscan, 2005, 308 p..

designed, both in terms of their own operations as well as their linkages with urban systems (social, economic and ecologic) and markets, can help fill these gaps.

This paper hopes to help foster that discussion by presenting a vision of ‘metropolitan’ agriculture. First, it explores a body of literature on systems theory applied to cities and urbanisation, drawing specifically on the notion of urban metabolism as a metaphor particularly suited to the framing of agricultural questions. It then introduces ‘metropolitan’ agriculture by reviewing previous scholarship on urban development in relation to food systems and agricultural change. The next section builds on this to explore the potential for a notion of metropolitan agriculture to create shared space between *urban* agriculture, an emerging agricultural paradigm, and *industrial* agriculture, identified here in the Kuhnian sense as the dominant agricultural paradigm.⁵ Finally, it elaborates a set of basic operational principles for design of metropolitan agricultural enterprises to constitute what Krueger and Agyeman call “actually existing sustainabilities,” ground level initiatives that foster sustainability within real world systems.⁶

Urban systems theory and metropolitan agriculture

Urban systems theory provides a toolkit for analyzing the city as a complex system. Similar to general systems theory, much early work on urban systems was descriptive and linear, and attempted to emulate the methods and analytic style of harder sciences. It often used ‘systems’ as a general term to indicate various patterns of interconnection between cities, and certain elements within a city, and theorize on their developmental and demographic implications.⁷ Systems theory in urban studies fell out of favour due to critiques of rigidity and reductivism during the late 1960s and 1970s, but more recent work on the interaction between social/human and ecological processes in the urban context has returned to the language of systems analysis.

A dominant thread in this contemporary discourse is the ecosystem metaphor. “Urban ecology” denotes the study of “cities *in* ecosystems or cities *as* ecosystems” and research on urban ecology falls across a large spectrum, from an emphasis on traditional scientific ecosystem analysis of the urban environment, to work that conceptualizes the relationship between social, natural/biological, and material processes.⁸ Alberti et al outline a model of urban ecology that highlights:

- Drivers (e.g. population growth, infrastructure investment)
- Patterns (e.g. land use, urban heat islands)
- Processes (e.g. economic markets, nutrient cycles)
- Effects/changes (e.g. human behaviour, biodiversity)⁹

⁵ Kuhn (Thomas), *The Structure of Scientific Revolutions*, Chicago, University of Chicago Press, 1962, 226 p.

⁶ Krueger (Rob) and Agyeman (Julian) (2005) “Sustainability schizophrenia or ‘actually existing sustainabilities?’ toward a broader understanding of the politics and promise of local sustainability in the US,” *Geoforum*, 36, 2005, p. 410-417

⁷ Berry (Brian) “Cities as Systems Within Systems of Cities,” *Papers of the Regional Science Association*, 13, 1964, 147-163.

⁸ Coelho (D.) and Ruth (M.) “Seeking a unified urban systems theory,” in *The Sustainable City IV*, eds. U. Mander (U) C.A. Brebbia (C.A.) and E. Tiezzi (E.), Southampton, UK, WIT Press, 2006, p. 179-188.

⁹ Alberti (M.) et al, “Integrating Humans into Ecology: Opportunities and Challenges for Studying Urban Ecosystems,” *Bioscience*, 53 no. 12, 2003, p. 1169-79

This incorporates both social as well as ecological processes, and attempts to illustrate their impact on each other within a larger urban system. The goal of such modelling is to find out “how patterns of human and ecological responses emerge from the interactions between human and biophysical processes and how these patterns affect ecological resilience in urban ecosystems.”¹⁰ Urban ecology facilitates analysis of the environmental impacts of urbanisation, and can shed light on the complex relationship between cities, the environment and landscapes in terms of material processes and degradation. Indeed, several long term urban ecology research projects on specific cities, such as Baltimore, present compelling findings on urban growth and environmental change.

Urban metabolism opens up a more holistic understanding of urban systems. In one of the first uses of the term, Newcombe et al stated that “we must come to understand and appreciate the nature of the inputs of urban settlements; their transportation networks; the capacity of their natural and man-made circulatory systems; the generation, disposal and resource potential of their wastes – in short, we must become familiar with the metabolism of our cities.”¹¹ Urban metabolism provides a framework that bridges research focused on clearly demarcated inputs as they contribute to and pass through the urban system (such as food, construction materials and fossil fuels) with more complex conceptualizations of the city as a socioeconomic and ecological space.¹² Mitchell writes that urban metabolism forces one to investigate the “social as well as biophysical [means] by which cities acquire or lose the capacity for sustainability in the face of diverse and competing problems.”¹³ The space that urban metabolism opens up for analysis of the social and economic components of the city, and their relation to the ecologic, makes it especially relevant for understanding the complex role of agriculture in urban systems.

In terms of agriculture and food systems, the *conceptual* break down of the barrier between city and nature widens the *spatial* lens of inquiry on ‘urban’ systems to include contextually relevant activities and processes that may stretch far beyond a city’s border. Brenner points to this when referring to the increasing need for “supraurban” scales of analysis for the urban question, building on the work of Lefebvre.¹⁴ The term metropolitan is used here in the same light, thus one can look at “metropolitan” agriculture as a term inclusive of ‘metabolic’ material systems of food production, as well as their social and ecological counterparts, which, when fit together, bring food from farm gate – whether in Oxfordshire or rural China – to the city.

Observers began discussing metropolitan ‘forms’ of agriculture in the 1980s as a relationship between the processes of rapid urban expansion and agricultural change became clear. Heimlich first used the term “metropolitan agriculture” in an article that provided “evidence of agricultural adaptations to demographic and social trends” in metropolitan statistical areas in the United States census.¹⁵ Looking towards the future he stated, “metro farms will increasingly adopt high-value enterprises, reduced-input or organic production methods, and innovative and direct marketing strategies to meet the constraints and to exploit the marketing advantages inherent in metro environments.” In the mid-1990s Gardner

¹⁰ Alberti (M.) et al, *ibid*.

¹¹ Newcombe (K.), Kalma (J.) and Aston (A.), “The metabolism of a city: the case of Hong Kong,” *Ambio*, 7, 1978, p. 3-15

¹² Warren-Rhodes (K.) and Koenig (A.) “Escalating Trends in the Urban Metabolism of Hong Kong,” *Ambio*, 30 no. 7, 2001, p. 429-38.

¹³ Mitchel (J. K.), “Urban Metabolism and Disaster Vulnerability in an Era of Global Change,” in *Earth System Analysis: Integrating Science for Sustainability*, eds Schellnhuber (H) and Wenzel (V), Berlin, Springer, 1998, p. 359-377.

¹⁴ Brenner (Neil), “The Urban Question: Reflections on Henri Lefebvre, Urban Theory and the Politics of scale,” *International Journal of Urban and Regional Research*, 24 no. 2, 2000, p. 361-378

¹⁵ Heimlich (Ralph), “Metropolitan Agriculture: Farming in the City’s Shadow,” *Journal of the American Planning Association*, 55 no. 4, 1989, p. 457-466

wrote that “farms survive in metro areas by adapting to urban-area product demand, by undertaking more diverse farm enterprises and by producing higher-value per acre products with a larger service component than non-metro farms.”¹⁶

Recent commentary affirms these trends. Lapping notes the significant expansion of niche product development and direct marketing via community supported agriculture schemes and farmers markets, as well as diversification into non-traditional products and services such as biomass fuel production and farm retreats, by farmers in metropolitan regions of the Northeast United States. Farm products and services continue to expand beyond the primary production process to incorporate elements of the food system such as processing, transportation and marketing, in order to add value and access new markets. This diversification is an adaptive strategy to the “complex re-articulation of socioeconomic space upon multiple geographical scales” that defines the transition towards “supraurban” metropolitan spaces.¹⁷

Two trends in agriculture: ‘Urban’ and industrial

In terms of material processes, “metropolitan” agriculture can be discussed in relation to two other agricultural models, urban and industrial.

Urban agriculture can imply anything from the individual gardener or allotment holder to larger community organisations and enterprises. RUAF, a leading urban agriculture advocacy and research organization, defines urban agriculture as “the growing of plants and the raising of animals within and around cities... embedded in, and interacting with, the urban ecosystem.”¹⁸ Urban agriculture remains an emergent field of study, under analysed from both a technical and theoretical perspective. McClintock presents a welcome contribution to theory for urban agriculture, and his use of “metabolic rift,” which draws on Marxian notions of alienation and social metabolism, provides an interesting counterpart to the discussion of metabolism in this paper. However, many scholarly and grey literature treatments of urban agriculture do not attempt such theory building and the plethora of case study analyses that do exist are unable to adequately treat the social, political and economic dynamics on which it touches.

Despite the heterodox nature of urban agricultural activity, there are some commonalities of cultivation technique and organizational approach that illustrate its properties as an emergent paradigm. Urban agriculture projects emphasize alternative cultivation methodologies and are often managed by small to medium scale community organisations and social enterprises. While there can be chemical-intensive forms of urban agriculture, especially on the individual garden level, much urban agriculture utilizes alternative agricultural methodologies such as organic farming or permaculture that seek to maximize productivity on spatially constrained urban and peri-urban plots.¹⁹ Many of these alternate methods emphasize the productive use of waste, often as agricultural input via organic composting, techniques such as companion planting of traditional non-commodity crops, and maximization of the positive

¹⁶ Gardner (Bruce), “Commercial Agriculture in Metropolitan Areas: Economics and Regulatory Issues,” *Agricultural and Resource Economics Review*. 23 no. 1, 1994, p. 100-109

¹⁷ Lapping, *ibid*; Brenner, *ibid*

¹⁸ Resource Centres on Urban Agriculture and Food Security (RUAF), “What is Urban Agriculture?,” 2010, accessed at <http://www.ruaf.org/node/512>.

¹⁹ Pearson (Leonie), Linda Pearson (Linda) and Pearson (Craig) “Sustainable urban agriculture: stocktake and opportunities,” *International Journal of Agricultural Sustainability*, 8 nos. 1 and 2, 2010, p. 7-19

impact of agriculture on elements of the larger environment, such as bird and insect life.²⁰ Some urban agriculture activities reach a high level of technical sophistication and productive output. Growing Power, an urban farm initiative in Milwaukee and Chicago, utilizes a multi-faceted organic production system that includes fisheries, composting of municipal waste, use of renewable energy, greenhouse vegetable production and high-value product development. This allows the organization economic self-sufficiency while it also maintains a commitment to community building, environmental education and social justice.²¹

Even multi-faceted and complex urban agriculture initiatives retain a necessarily limited spatial focus on their own operating systems and interactions with the immediate environment and community. In addition, the high yields and complexity of Growing Power's system represents a minority of urban agricultural initiatives. Garnett writes that "many community food-growing schemes have clear environmental aims: to promote biodiversity through organic growing [and] to reduce waste through recycling and composting," while a smaller percentage of groups extend efforts to technical sophistication and commercial viability.²² Organizationally, many urban agriculture initiatives focus on community development through environmental and nutritional education, maintenance of urban biodiversity and regeneration of blighted or disused urban areas.²³ Urban agriculture generally emphasizes high quality production with a minimum of external inputs, and which fosters various types of community development and environmental conservation through small to medium scale organizations that link agriculture with other aspects of urban life, economically or otherwise. It can thus be seen as an emergent agricultural paradigm.

At the other end of the spectrum, 'industrial' agriculture refers to the dominant mainstream agricultural paradigm. The term implies large scale, specialized agricultural operations that utilize chemical inputs and other technologies, from biotechnology and transgenic seeds to sophisticated machinery and farm infrastructure, to maximize crop yields and development of animal products.²⁴ Modern industrial agriculture evolved out of significant intensification in production systems and economic restructuring of the agricultural sector, first at a regional level throughout the West in the decades after World War II and more recently at a global level as many developing and middle income countries enter into commodity crop markets.²⁵ Structural changes in farm ownership and management practices also underpinned the yield intensifications. These changes brought significantly higher levels of outside capital investment in large agricultural enterprises along with consolidated management in the hands of

²⁰ Cofie (Olufunke), Adam-Bradford (A.) and Drechsel (Pay), "Recycling of Urban Organic Waste for Urban Agriculture," in *Cities Farming for the Future – Urban Agriculture and Productive Cities*, ed. René van Veenhuizen (Rene), RUAF and IDRC, 2006, p. 209-242

²¹ Broadway (Michael) "Growing Urban Agriculture in North American Cities: The Example of Milwaukee," *Focus on Geography*, 52 nos. 3-4, 2009, p.23-30.

²² Garnett (Tara) "Urban Agriculture in London: Rethinking our food economy" in *Growing Cities, Growing Food: Urban Agriculture on the policy agenda*. RUAF, 2005, p. 477-500

²³ Brown (Katherine) and Carter (Anne) "Urban Agriculture and Community Food Security in the United States: Farming from the City Center to the Urban Fringe," Community Food Security Coalition, North American Urban Agriculture Committee, 2003, 29 p.

²⁴ Union of Concerned Scientists, *Industrial Agriculture: Features and Policy*, 2007, report accessed at: http://www.ucsusa.org/food_and_agriculture/science_and_impacts/impacts_industrial_agriculture/industrial-agriculture-features.html

²⁵ Patel (Raj), *Stuffed and Starved: Markets, power and the hidden battle for the global food system*, London: Portobello Books, 2008, 448 p.

specialized corporate entities and private farm managers.²⁶ This evolution resulted in a highly efficient, highly productive agriculture that delivers low-cost food to ever growing consumer bases, and the structural changes outlined above continue to evolve. The industrial system thus acts as the dominant agricultural paradigm and much agricultural research and development, both in the public and private sector, can be seen as Kuhnian “puzzle solving” to tweak technical and managerial elements of the system, rather than critique the larger system as a whole.

Despite these demonstrable gains in yield and production, there is concern over the ‘hidden’ costs of industrial agricultural practices. Albert Howard’s *An Agricultural Testament*, a critique of the impact of synthetic fertilizer on soil chemistry, is widely credited with launching the modern organic agriculture movement.²⁷ Other critiques point towards long-term environmental impacts such as decreased biodiversity, soil loss through erosion, and contamination of ground and surface water by chemical runoff and animal waste.²⁸ Beyond cultivation technique, consolidation of the agricultural sector has made it more difficult for small and mid-sized farms to survive. Tegtmeier and Duffy, in an attempt to quantify the cumulative impact of these general environmental and social ‘externalities’ as well as the system of agricultural subsidies and regulation in the United States, estimate it to be anywhere from \$5.7 to \$16.9 billion annually.²⁹ There is a broad consensus that the current paradigm industrial agriculture is unsustainable.

Little alternative to industrial agriculture exists at the global level. Urban agriculture advocacy often incorporates critique of the industrial agriculture paradigm. However, this could lead to a new orthodoxy in discourse that, either explicitly or implicitly, promotes a view of urban self-sufficiency that may be unrealistic. This is particularly true in cities in the Global North where discussion on this topic is hampered by a severe dearth of quantitative research on crop yields or economic activity generated from urban agriculture. While a higher proportion of food consumed in many cities in the Global South is produced in or near urban areas, they remain far from self-sufficiency.³⁰

Metropolitan agriculture: Towards “actually existing sustainabilities”

Metropolitan agriculture implies agricultural processes occurring on multiple spatial scales, connected to the city at a metabolic level. An operational framework for real world projects based on this notion, focused on economic viability and environmental stewardship while also driving larger processes of community and regional development, could help bridge the divide between critique of industrial agriculture and the reality on the ground.

Between 2005 and 2010, TransForum, a Dutch agricultural research and development foundation, carried out a number of projects that worked to operationalize a vision of metropolitan agriculture. In the context of TransForum’s work, van Lateseijn defined metropolitan agriculture as “a deliberately

²⁶ Gray (Allan) and Boehlje (Michael), “The Industrialization Of Agriculture: Implications For Future Policy,” Purdue University, College of Agriculture, Department of Agricultural Economics, Working Paper 10, 2007, 16 p.

²⁷ Howard (Albert) *An Agricultural Testament*, London, Oxford University Press, 1943,

²⁸ Union of Concerned Scientists, *Hidden Costs of Industrial Agriculture*, 2008, report accessed at:

http://www.ucsusa.org/food_and_agriculture/science_and_impacts/impacts_industrial_agriculture/costs-and-benefits-of.html.

²⁹ Tegtmeier (Eric) and Duffy (Michael), “External Costs of Agricultural Production in the United States,” *International Journal of Sustainable Agriculture*, 2 no. 1, 2004, p. 155-175.

³⁰ Dreschel (P.), Graefe (S.) and Fink (M.), *Rural-urban food nutrient and virtual water flows in selected West African Cities*, IWMI Research Report 115. Colombo, Sri Lanka, International Water Management Institute, 2007.

designed system of intelligently connected [agricultural] production sites that uses the available resources, conditions and infrastructure in metropolitan areas to produce material and immaterial demands for the same metropolitan area.”³¹ Wascher et al, in an analysis of the pilot projects supported by TransForum, expand on this definition by identifying these underlying characteristics for projects defined as metropolitan agriculture:

- (1) spatial-functional entities with boundaries determined by system integration at the production level thereby defining what constitutes a metropolitan area;
- (2) sustainable principles, namely the limitation of agriculture’s ecological footprint by promising to use only those resources, conditions and infrastructure that are available in the same area of demand;
- (3) a multifunctional approach by covering society’s material as well as immaterial demands (commodity and non-commodity goods and services)³²

This can be distilled into a clear, but flexible, blueprint for operational design of project-level initiatives that transcend spatial and conceptual borders, while fostering a variety of linkages between cities and agriculture. The first characteristic above breaks down the spatial barrier between urban and rural, defining ‘metropolitan’ along the lines of Lefebvre instead of political or geographic borders, and emphasizes the creation of linkages up and down the value chains that exist outside of discreet spatial scales. Therefore, an illustrative metropolitan agricultural project could involve a primary producer(s) in a ‘rural’ setting, a distribution entity without a clearly defined, static spatial location, and a marketing outlet with several ties to an urban centre, all of whom develop a partnership to leverage their capacities in new, sustainable and profitable ways.

The second characteristic intentionally recognizes the potential for different definitions of sustainability to exist among separate actors, while emphasizing a biological vision of closed loop production processes and clearly stating the need to decrease the ecological burden of activities related to food and agriculture regardless of specific methodology. This allows for contextual elaboration of how best to plan a project’s cultivation or husbandry systems, chemical and fossil fuel usage, etc, with the stipulation that all elements of the “planners triangle” – economic, social and environmental sustainability – are equally weighed.³³ While some may critique this openness as lacking in sufficient rigour to counteract the scale of current degradation, its purpose is to diffuse ideologically driven conflict that can preclude any meaningful progress or experimentation on the ground, and to acknowledge that no one theory or approach to sustainable agriculture can fit all contexts.

The third characteristic helps broaden the mandate of agriculture to include various post-harvest and non-food products and services, linking it with other elements of the urban metabolism. A farm thus might invest in its capacity to provide services such as health care and rehabilitation, tourism and landscape, wildlife and resource conservation, as well as into niche market food products. Farmers have long sought ways to diversify their income and many of these ideas are not new, but this guideline helps

³¹ Van Latesteijn (H.C.), “TransForum: organizing the transition towards Metropolitan Agriculture,” paper presented at Transitions in Agriculture Conference, Ede, the Netherlands, 2008

³² Wascher (Dirk), Agricola (Herman), Breman (Bas) and Anderson (Barbara) “Innovation Characteristics for Sustainable Metropolitan Agriculture: Spatial-Functional Perspectives for TransForum Innovative Projects,” Wageningen, Wageningen University Research, 2009, 59 p.

³³ Campbell (Scott) “Green cities, growing cities, just cities?,” *Journal of the American Planning Association* 62 no. 3, 1996, p. 296-312

clarify these potential opportunities. The investment, in turn, opens up the potential for partnership with a variety of other ‘metropolitan’ entities.

Further, in terms of process, ongoing cross-sectoral multi-stakeholder engagement underpins all three of these characteristics. This solidifies a more expansive conceptualization of metropolitan agriculture by linking traditional players in the food sector (e.g. farmers, supermarkets) with other non-traditional actors (e.g. NGOs, outside service providers).

Taken in the context of research that outlined the adaptive strategies of metropolitan farmers, the guidelines above open up space between the socioeconomically and ecologically destructive elements of industrial agriculture and the systems-level anomalies of urban agriculture. A continued program of research and multi-stakeholder project design to actualize these guidelines would point towards real-world solutions that seek to create what geographers call “actually existing sustainabilities” in the agricultural context, a spatio-relational paradigm for exploration of agricultural sustainability on the ground.³⁴ Indeed, as Krueger and Agyeman assert, sustainability “is a social process with the resultant tensions emerging from enormous differences in social, institutional, and discursive practices that often seem irrational,” but that “we must consider that in these capitalist places alternative outcomes can exist...The danger is that if we do not explore this analytical thread and link it to action, these opportunities will go unrealized.”³⁵ Conceptualizing agriculture at the metropolitan level opens space to explore this consideration.

A care farming innovation project supported by TransForum provides an heuristic case study of metropolitan agriculture as outlined above. The UK’s National Care Farming Initiative defines care farming as “the therapeutic use of farming practices,” or the integration of therapeutic and other health programs, tailored towards certain at-risk and vulnerable groups such as recovering addicts, drop-outs and people with mental health issues, with production farms.³⁶ Care farming presents farmers with the chance to provide non-agricultural services of benefit to the wider community, along the lines of Lapping’s observed trends. In Green Care Amsterdam, TransForum assisted with the organisation of an independent foundation – Landzijde – to serve as a hub for information regarding care farming opportunities, to connect farmers with health care providers and to help manage the overall process. Landzijde, currently a fully functional and self-sustaining organization that continues its work to spread care farming, acts as a facilitator whose business model focuses on financial gain for agricultural enterprises and higher success rates for treatment organisations and the patients themselves.³⁷ Beyond the quantitative benefits, the process allows farmers to provide a service beyond the production of food that reconnects them to the wider community and gives the patients unique, confidence-building and productive work.

Conclusion

³⁴ Whitehead (Mark), *Spaces of Sustainability: Geographical Perspectives on the Sustainable Society*. London, Routledge, 2006, 256 p.

³⁵ Ibid

³⁶ National Care Farming Initiative (NCFI) (2010) *NCFI Newsletter Spring 2010*, 2010, report accessed at: <http://www.ncfi.org.uk/uploads/Newsletters/NCFI%20Newsletter%20-%20Spring%202010.pdf>

³⁷ Eweg (H.P.A.) and Hassink (J.) “Business models of Green Care in the Netherlands,” paper presented at Special Session on Care Farming, 7th International PENSA Conference, Sao Paulo, Brazil, 2009.

When analysed from a systems perspective, agriculture exists in cities via complex networks and multi-scalar spatial boundaries. Its contribution to urban social, economic and ecological processes comes from a diversity of production methods, elaborate distribution and marketing systems, and the relationship of these to the dynamics of individual consumption. Urban metabolism provides a body of theory that enables analysis of this complexity, and metropolitan agriculture presents a framework for understanding the multiple spatialities of agriculture within it.

Discussion of urban and industrial agriculture provides context for what metropolitan agriculture looks like on the ground. Metropolitan agricultural initiatives seek to diversify farm operations and re-connect cities with agriculture while addressing structural issues within food systems. The paper drew on the experience of TransForum, in particular their experience with a care farming initiative in the Netherlands, to show the potential for research and action to explore agricultural that are more sustainable ecologically, economically and socially while providing a more diverse range of services to urban populations.