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POLICY BRIEF

Urban agriculture: a productive land-use for cities?

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As urban populations rapidly increase in the developing world, so do the challenges of feeding those who live there. This policy paper explores the ways that city governments can harness the benefits of urban agriculture, without disrupting the core purpose of a city of density and connectivity.

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Urban agriculture: a productive land-use for cities?

As urban populations rapidly increase in the developing world, so do the challenges of feeding those who live there. In cities, people mostly rely on buying instead of growing their food. However, the high incidences of poverty and unemployment, and the rising costs of living in developing cities, mean that many households are unable to afford the food they need to live healthy and productive lives. This is exacerbated by economic shocks, as we have seen with the COVID-19 pandemic. Urban agriculture (UA) is one solution that is gaining traction as a way to provide the urban poor with a safety net in times of crisis, improve food security and dietary diversity, achieve climate and urban greening objectives, and enhance economic opportunity.

However, if not implemented carefully, urban agriculture can impede the density and clustering of people and information that make cities hubs of productivity, prosperity, and growth. Furthermore, the rising cost of land in cities, as well as the scale required to make a decent living from farming, prices most agricultural activity out of the city. There are also several food and environmental safety concerns surrounding urban agriculture that need to be carefully dealt with to avoid spreading disease, polluting city water supplies, and producing contaminated food products.

This policy paper explores the ways that city governments can harness the benefits of urban agriculture, without disrupting the core purpose of a city of density and connectivity, and the resulting policy implications.

1. **Urban agriculture provides several social and environmental benefits,** including community cohesion, dietary diversity, urban greening, moderate incomes for vulnerable groups, and household resilience to shocks. However, unless well organised, it is unlikely to drive down food prices or substantially expand the supply of food.

2. **Urban agriculture can also be a viable economic sector,** but usually for speciality goods produced for a high-end market. Commercial UA is well-suited to goods that do not transport well, require little space, and have short production cycles.

3. **While urban agriculture may not always merit subsidisation, it should not be outlawed either.** UA needs to be enabled to ensure the immediate benefits of community resilience are realised whilst avoiding the long-term costs of inefficient land-use.

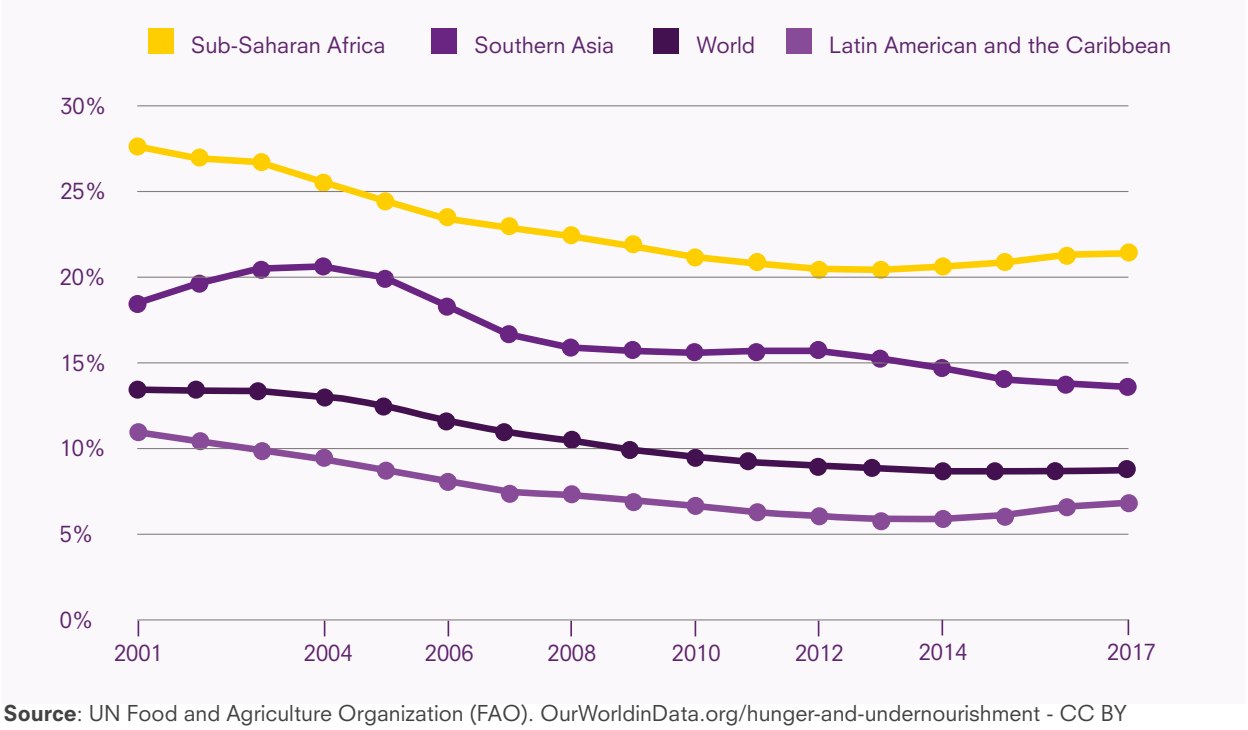
4. **Most importantly, UA should be mainstreamed into both urban development and agricultural policies, plans, and regulations** to ensure clarity of mandates and safety and security for those working in the sector. This will enhance collaboration and coordination between different sectors and spheres of government, promoting a holistic food systems approach and raising awareness around efficient use of limited urban land.

Cover image: People working in a small vegetable garden on the banks of the Niger River in Segou, Mali, West Africa. Photo by Wolfgang Kaehler/LightRocket via Getty Images

Urban agriculture, food security, and livelihoods

Food insecurity and malnutrition remain major developmental threats, especially in Africa where the indicators have been worsening. Between 2014 and 2018, the prevalence of food insecurity and malnutrition increased from 20.8% to 22.8% in sub-Saharan Africa, as depicted in Figure 1 below.[1] Given the close link between food insecurity, global supply chains, and poverty, the situation is made more precarious during global crises such as the COVID-19 pandemic. It is also increasingly threatened by extreme weather events caused by climate change. This points to the fact that achieving SDG 2 of eradicating hunger and improving nutrition by 2030 will remain out of reach in the continent unless concerted efforts are made to tackle the barriers to achieving food security and nutrition.

Figure 1: Undernourishment by world region



Source: UN Food and Agriculture Organization (FAO). OurWorldinData.org/hunger-and-undernourishment - CC BY

With rapid urbanisation, food insecurity, which was largely associated with rural areas, is fast shifting to cities and towns.[2] Developing cities are facing the dual problem of low-quality and high-cost food, resulting in widespread urban food insecurity. This goes beyond the production of food, which is often plentiful, to the entire formal and informal urban food system encompassing infrastructure, transport, and retail, all of which influence how people access food. High costs of production, accompanied by widespread unemployment and poverty, limit people's ability to access food.

Achieving SDG 2 of eradicating hunger and improving nutrition by 2030 will remain out of reach in Africa unless concerted efforts are made to tackle the barriers to achieving food security and nutrition.

1 FAO, ECA, and AUC, 2020. Africa Regional Overview of Food Security and Nutrition 2019.

2 Poulsen, M.N., McNab, P.R., Clayton, M.L., and Neff, R.A., 2015. A systematic review of urban agriculture and food security impacts in low-income countries. Food Policy 55, 131–164.

It is widely recognised that addressing this requires a systems approach – however, whether urban agriculture is a viable part of this system has been widely debated[3]. Some see it as an excellent solution to joblessness, urban vulnerability, and food insecurity,[4] while others see it as a low-value and ineffective use of urban space, with damaging public health consequences.[5]

What is urban agriculture?

Urban agriculture, which also includes peri-urban agriculture, has been defined broadly as growing of crops and raising of small livestock within the boundaries of cities and towns for either household consumption or sale to urban consumers.[6] Urban and peri-urban agriculture is widespread the world over. For example, in Sub-Saharan Africa, it is practised by between 20% and 84% of urban households, depending on the city,[7] driven by rising demand for food in urban areas and the proximity to input and output markets.[8] As mentioned above, other factors such as urban unemployment and the associated poverty and food insecurity are also critical in pushing households into urban agriculture as a survival mechanism.[9]

Crop production techniques include backyard or homestead gardening, open field farming, hydroponics, irrigation (drip, furrow, and bucket), and greenhouse farming. Other practices include multi-story gardens, hanging gardens, moist beds, and shade net farming. The crops and technologies used may vary from city to city as summarised in Table 1. In many cases, a mixture of crops and/or livestock are farmed – both for diversification of diets or as insurance against failure of any single enterprise. Notably, urban agriculture is usually not purely rain fed. Farmers supplement the rain with some form of irrigation, either by using wastewater, borehole water, and/or tap water.

In sub-Saharan Africa, urban agriculture is practised by between 20% and 84% of urban households, depending on the city, driven by rising demand for food in urban areas, the proximity to input and output markets, as well as urban poverty and unemployment.

This demonstrates that a dualism exists in urban agriculture just like in rural agriculture - subsistence exists side by side with commercial approaches. For example, backyard or community farmers growing a variety of vegetables in any available space, versus an aquaponics or controlled-environment microgreen plant in an industrial part of the city. Figure 2 shows the urban agriculture spectrum from subsistence to smallholder commercial to larger scale commercial.

3 Frayne, B., McCordic, C., and Shilomboleni, H., 2016. The mythology of urban agriculture. In: Crush, J., Battersby, J. (Eds.), Rapid Urbanisation, Urban Food Deserts and Food Security in Africa. Springer, Cham.

4 For example, see Miccoli, S., Finucci, F., and Murro, R., 2016. Feeding the Cities Through Urban Agriculture The Community Esteem Value. *Agric. Agric. Sci. Procedia* 8, 128–134.

5 For example, see White, S., and Hamm, M.W., 2014. Urban agriculture and a planning approach to urban food systems. Center Report Series, No. 4. Global Center for Food Systems Innovation, Michigan State University, East Lansing, USA, (4), 23pp.

6 Poulsen, M.N., McNab, P.R., Clayton, M.L., and Neff, R.A., 2015. A systematic review of urban agriculture and food security impacts in low-income countries. Food Policy 55, 131–164.

7 Ayerakwa, H.M., 2017. Urban households' engagement in agriculture: implications for household food security in Ghana's medium-sized cities. Geographical Research, Vol. 55 No. 2, pp. 217-230.

8 For example, see Lagerkvist, C.J., 2014. Economic drivers for urban and peri-urban agriculture. In: Magnusson, U. and Bergman, K.F., (Eds). Urban and peri-urban agriculture in low-income countries - challenges and knowledge gaps. SLU-Global Report 2014: 4, 11-14.

9 Orsini, F., Kahane, R., Nono-Womdim, R., and Gianquinto, G., 2013. Urban agriculture in the developing world: a review. Agron. Sustain. Dev., 33, 695-720.

Table 1: Urban agriculture in selected cities[10]

Elements of urban agriculture	Case study cities			
	Accra-Ghana	Bangalore-India	Lima-Peru	Nairobi-Kenya
Agricultural land (ha.)	No data	11,463 (2009)	12,680 (2006)	650 (2008)
Main water sources for agriculture	• Rain water • Wastewater (urban)	• Rain water • Bore wells	• River water (peri-urban) • Municipal drinking water • Wastewater	• Rain water • Wastewater (urban)
Food staples grown	• Maize • Rice • Roots/Tubers • Millet/ • Sorghum	• Rice • Sorghum	• Maize • Rice • Tubers	• Maize • Roots/Tubers
Main types of low-income urban & peri-urban agriculture practised	• Container gardening • Homestead gardening • Open space commercial horticulture • Subsistence and commercial livestock • Fisheries	• Container gardening • Homestead gardening • Commercial horticulture and cereals • Commercial livestock	• Container gardening • Homestead agriculture • Community gardens • Institutions (e.g. Colleges, meal centres) • Commercial horticulture • Livestock and fish farming	• Container gardening • Homestead agriculture • Open space gardening (on public land) • Commercial horticulture • Commercial livestock
Main crops grown/ livestock reared	• Vegetables- Maize • Cassava • Poultry • Sheep and goats • Fish	• Rice, Sorghum, Maize, Vegetables- Fruits, Poultry • Sheep and goats • Cattle and buffalo	• Vegetables • Fruits • Aromatic plants • Forage • Ornamental plants	• Vegetables • Maize • Poultry • Sheep and goats • Cattle

* Excludes the areas irrigated with wastewater and small-scale urban areas

Figure 2: Spectrum of urban agriculture from subsistence to commercial

10 World Bank, (2013). Urban agriculture: Findings from four city case studies (English). Urban development series knowledge papers, no. 18 Washington, D.C.: World Bank Group.

Contribution to food security, livelihoods, and sustainability

There are four potential benefits of promoting urban agriculture:

— **Enhancing food and nutrition security:** The crops and animals produced are either consumed directly or marketed for purchase of other consumption goods. Because the products involve little or no transport, they are sometimes more affordable compared to those brought in from distant rural farms. Households also have the advantage of producing their culturally preferred foods, for example, vegetables which the markets would normally not offer. Local production also improves the resilience of cities by reducing exposure to food supply shocks.

— **Income generation:** Households can sell their surplus output at urban markets to raise income. Further, those employed on larger farms on either a full- or part-time basis also earn incomes to improve their lives and enable them to purchase processed products from the formal retail outlets, growing these businesses as well.[11] Even sellers of agricultural inputs and farm implements improve their sales as urban agriculture flourishes.

— **Improved environmental conservation:** Urban food gardens can take on the form of multi-functional green assets – playing an integral role in connecting the built and natural environment in cities.[12] They can provide critical ecosystem services, including improving biodiversity, air purification, the reduction of urban heat-island effect, carbon capture, avoiding storm-water runoff, flood management, nitrogen fixation, energy savings, and organic waste recycling. A study shows these services could be worth US$160 billion each year globally[13], and contribute to substantial reductions in GHG emissions. It can also be utilised to educate and improve the connection to nature in cities.

— **Social inclusiveness:** Urban agriculture can be used to catalyse neighbourhood and community cohesion through the development of cooperatives and groups – a way of life that has been around for millennia, but recently lost in cities.[14] Farmers and traders can establish livelihood networks – and as low-skill work, it particularly enhances the economic inclusion of women, youth, and other vulnerable groups.[15]

A dualism exists in urban agriculture just like in rural agriculture – subsistence exists side by side with commercial approaches.

Local production improves the resilience of cities by reducing exposure to food supply shocks.

11 Battersby, J., and Watson, V., 2019. Urban food systems governance and poverty in African cities. Routledge, London & New York.

12 Camargo Nino, E., Lane, S., Okano, K., Rahman, I., Peng, B., Benn, H., Culwick Fatti, C., Maree, G., Khanyile, S. and Washbourne, D.C., 2020. Urban agriculture in the Gauteng City-Region's green infrastructure network.

13 Chandra, R., 2019. With farms atop malls, Singapore gets serious about food security. Thomson Reuters.

14 Parece, T., and Campbell, J., 2017. A Survey of Urban Community Gardeners in the USA. In: Winklerprins, A. (Ed.), Global urban agriculture: convergence of theory and practice between North and South. CABI, Boston, MA.

15 Bellwood-Howard, I., Häring, V., Karg, H., Roessler, R., Schlesinger, J. and Shakya, M., 2015. Characteristics of urban and peri-urban agriculture in West Africa: Results of an exploratory survey conducted in Tamale (Ghana) and Ouagadougou (Burkina Faso). IWMI Working Paper 163. Colombo, Sri Lanka: International Water Management Institute, 30pp.

In Nairobi, for example, urban and peri-urban agriculture play an important role for food and nutrition security and income. About 20% of the city's food requirements come from urban and peri-urban agriculture,[16] and 14% of the land area in the city is farmed, with average land sizes being 0.53 acres in urban areas and 1.44 acres in peri-urban areas.[17] In fact, between 2000 and 2010, Nairobi had the highest growth rate in the improved dairy cattle population in Kenya – about 4%.[18] In Cape Town, the Philippi Horticulture Area (which is just 20 minutes from the city centre) produces over 50% of fresh produce sold in the city.[19]

However, for a long time, urban and peri-urban agriculture have been treated with contempt, being seen as informal and unacceptable on the basis of congestion, security, hygiene, and illegality.[20] Instead, formal retail outlets were favoured for their perceived contributions to economic development, job creation, and operational scale to provide consistent and affordable food.[21] A survey of 11 cities in sub-Saharan Africa found that around 22% of urban households engaged in agriculture[22], and that the output was too small to make meaningful contribution to household food or income.[23] A study in Philadelphia found that, in most cases, urban agriculture cannot meet the food justice, social capital, and job creation goals while also being financially self-sustaining.[24]

Urban food gardens can take on the form of multi-functional green assets – playing an integral role in connecting the built and natural environment in cities.

In a study conducted in the Gauteng region of South Africa it was found that most food gardens are found in wards with a medium unemployment level, while wards with high unemployment, who may need them most, had few food gardens.[25]

16 Cofie, O.O., Van Veenhuizen, R., and Drechsel, P., (2003). Contribution of urban and peri-urban agriculture to food security in sub-Saharan Africa. *Africa Day of the 3rd WWF in Kyoto, 3*.

17 Republic of Kenya, (2018). County Annual Development Plan (CADP), 2017/2018. Government Printers, Nairobi.

18 USAID-KAVES, (2015). USAID-KAVES Dairy Value Chain Analysis. Kenya Agricultural Value Chain Enterprises (KAVES).

19 Sullivan, H., (12 October 2016). The urban farms that grow half the vegetables eaten in Cape Town. How we made it in Africa.

20 Battersby, J., and Watson, V., 2019. Urban food systems governance and poverty in African cities. Routledge, London & New York.

21 Skinner, C., 2016. Informal Food Retail in Africa: A Review of Evidence. Consuming Urban Poverty Project Working Paper No. 2. Cape Town: Consuming Urban Poverty project.

22 Crush, J., Hovorka, A., and Tevera, D., 2011. Food security in Southern African cities: the place of urban agriculture. *Progr. Develop. Stud.* 11 (4), 285–305.

23 Frayne, B., McCordic, C., and Shilomboleni, H., 2014. Growing out of poverty: does urban agriculture contribute to household food security in Southern African Cities? Urban Forum 25 (2), 177–189.

24 Hunold, C., Sorunmu, Y., Lindy, R., Spatari, S., and Gurian, P.L., (2017). Is urban agriculture financially sustainable? An exploratory study of small-scpale market farming in Philadelphia, Pennsylvania. Journal of Agriculture, Food Systems, and Community Development, 7(2), 51–67.

25 Camargo Nino, E., Lane, S., Okano, K., Rahman, I., Peng, B., Benn, H., Culwick Fatti, C., Maree, G., Khanyile, S. and Washbourne, D.C., 2020. Urban agriculture in the Gauteng City-Region's green infrastructure network.

The fact that in some cities only a few of the urban poor engage in agriculture is not surprising. Most cities have limited open spaces for food production, and even where land is available and the poor can access it, they do not have secure tenure and only cultivate illegally or on rental terms.[26] Wages in urban farming also tend to be lower. In Nairobi, 30% of urban farm workers earn less than the recommended agricultural wage, with wages generally getting better in peri-urban areas.[27] Farming also requires time, skill, and inputs, something that many poor households with numerous competing pressures cannot afford.

Despite somewhat variable income and food security benefits, literature from across the world seems to unanimously underscore the particular importance of urban and peri-urban agriculture for household food security in times of crises.[28] The COVID-19 pandemic is one such example that highlights the role of strong local food systems in building resilience to shocks when global trade and reliance on other countries for food staples becomes unviable. Box 1 and 2 explore the use of urban agriculture to build resilience in Freetown and Rosario, respectively.

In most cases, urban agriculture cannot meet the food justice, social capital, and job creation goals while also being financially self-sustaining.

BOX 1: URBAN AGRICULTURE TO IMPROVE RESILIENCE AND FOOD SECURITY DURING THE CORONAVIRUS PANDEMIC IN FREETOWN, SIERRA LEONE[29]

As part of the mayor's 'Transform Freetown' agenda, the Freetown City Council has supported 300 households across three informal communities with seedlings, a planting box, farming tools, and technical training to start their own home food gardens. This has been a key aspect of their COVID-19 response plan to improve resilience of some of the most vulnerable households during potential lockdowns. Beneficiaries were selected based on their vulnerability (e.g. female single-parent household), their willingness to farm, the availability of space to farm, and previous experience in farming. There are plans to expand the programme as more funding becomes available.

26 FAO, 2012. Growing greener cities in Africa. First status report on urban and peri-urban horticulture in Africa. Rome, Food and Agriculture Organization of the United Nations.

27 Mwaura, M.N., Mukoya-Wangia, S., Origa, J.O., Mbatia, O.L.E., (2019). Characteristics of Urban and Peri-Urban Agriculture Farmers and Resources in Nairobi County, Kenya. *International Journal of Agricultural and Environmental Sciences*, Vol. 4, No. 3, 2019, pp. 30-37.

28 in SSA (see Smart et al., 2015; Toriro, 2019 for example), South America (see Hammelman, 2017), Europe (Seguí et al., 2017) and even North America (Chan et al., 2017).

29 Transform Freetown: Second Year Report. January 2020 - January 2021. https://fcc.gov.sl/wp-content/uploads/2021/02/Transform-Freetown-2-Year-Final-report-min.pdf

Image: World Resources Institue/Prize for Cities

Above: Vegetable Garden Park in Rosario, Argentina.

BOX 2: FROM RESILIENCE TO ECONOMIC CRISES TO BUILDING INCLUSIVE CLIMATE RESILIENCE – URBAN AGRICULTURE IN ROSARIO, ARGENTINA[30]

In June 2021, Rosario – the third most populous city in Argentina with around 1.8 million residents – won the WRI grand Prize for Cities for its urban agriculture programme that has demonstrated results in building inclusive climate resilience to flooding and extreme heat events, and improved access to healthy, local food

Sustainable Food Production for a Resilient RosarioThe project started out as a response to the economic crisis in 2001, which left a quarter of Rosario's population unemployed and more than half of residents below the poverty line. The city provided residents with tools, seeds, and training – and identified underutilised land that could be used for production. It also set up permanent markets that could be used for trading, and integrated social programmes for education and youth development by opening space to farm at schools and other public centres. As a result, 75 hectares of land are now dedicated to urban farming, with another 800 hectares in peri-urban areas. 2400 families started their own gardens, almost 300 farmers (65% of which are women) have temporary ownership of public and private land, and seven permanent marketplaces have been created.

30 WRI. 29 June 2021. Prize for Cities Awarded to Rosario, Argentina, for improving resilience and equity through urban agriculture. Media press release, Washington, D.C.

The level of benefits derived from urban agriculture are therefore contextual, varying based on geography, farmer characteristics, and the regulatory environment.[31] Table 2 shows that profitability changes depending on a number of factors. The margins are higher in the smaller city, Thika, than in Kisumu for co-owning farmers, middle income farmers, farmers who undertake free range and those who do not use supplementary purchased feeds, farmers without access to market information, and farmers who sell directly to consumers. While the relationship between gross margins and access to information may look surprising, it is possible that having access to market information is correlated with something else – perhaps proximity to the inner city – that inhibits profitability. It is therefore important to note that these findings do not help us in understanding what drives these differences, and that such insights require further research.

The level of benefits derived from urban agriculture are therefore contextual, varying based on geography, farmer characteristics, and the regulatory environment.

Table 2: Gross margins in urban poultry farming in Kenya: Kisumu and Thika Trade-off's in promoting urban agriculture[32]

	Proportion of households (%)	Mean GM (Ksh/bird)
City		
Kisumu	70	533
Thika	33	1,185
Gender of farmer		
Female	32	598
Male	20	693
Co-ownership	48	894
Income class		
Low	39	561
Middle	40	1,114
High	27	583
Production system		
Free range	39	884
Deep litter	22	652
Mixed	39	692
Supplementary purchased feed		
Yes	91	740
No	9	958
Access to market information		
Yes	71	736
No	29	805
Market channel		
High value markets	10	899
Brokers / retailers	38	511
Direct to consumers	52	919

31 Omondi, S.O., 2018. Small-scale poultry enterprises in Kenyan medium-sized cities. Journal of agribusiness in Developing and Emerging Economies 9: 3, 237-254.

32 Omondi, S.O., 2018. Small-scale poultry enterprises in Kenyan medium-sized cities. Journal of agribusiness in Developing and Emerging Economies 9: 3, 237-254.

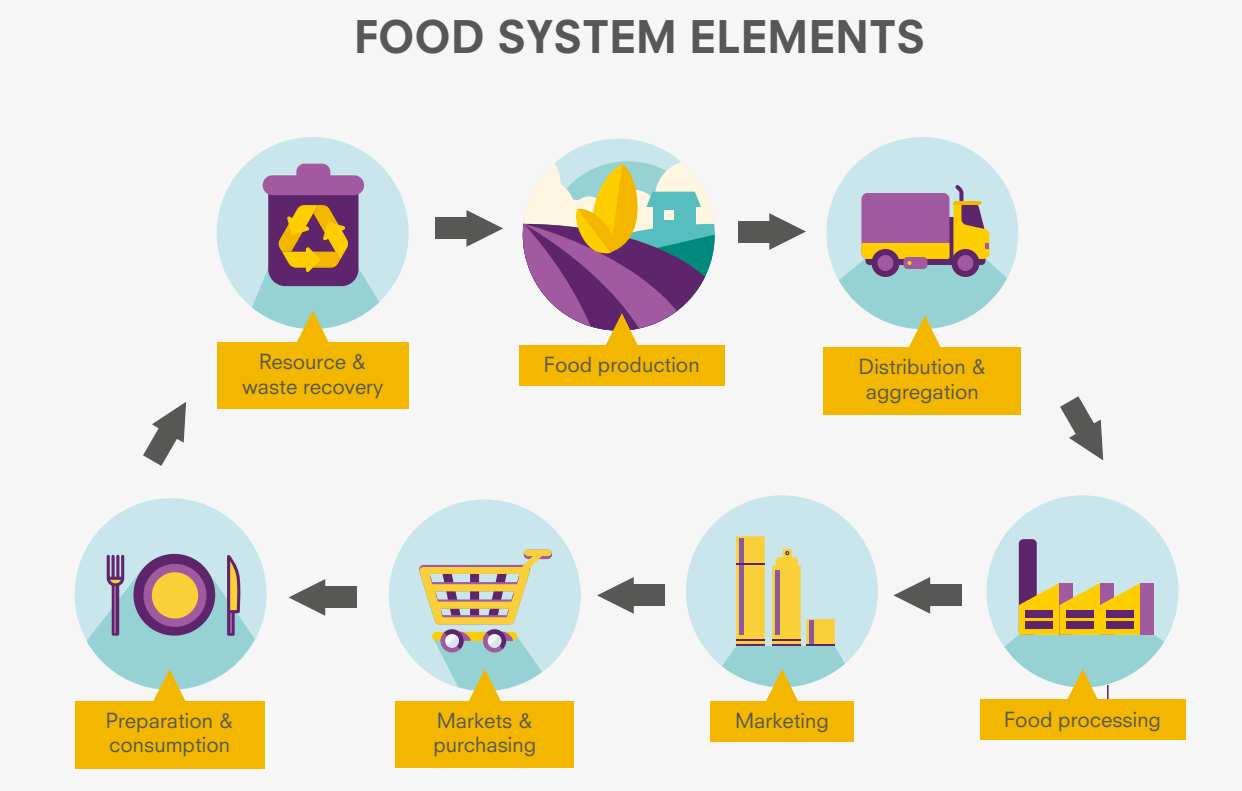
Image: Majority World/Isreal Williams/Universal Images Group via Getty Images

A husband and wife planting vegetation in Sierra Leone.

Trade-off's in promoting urban agriculture

To understand urban agriculture and its role in creating productive, liveable, and sustainable cities, it needs to be analysed as one element of a broader urban food system. This includes the production, distribution and aggregation, processing, marketing, retail, preparation and consumption, and waste and recovery, as depicted in Figure 3. The following section outlines key considerations and their trade-off's in promoting urban agriculture across the urban food system. This can also be extended beyond food to other agricultural products such as flowers or medication.

Figure 3: The urban food system



Source: Socratic Q&A: What are food systems and what is the difference between global systems and community food systems?

Food production

The main inputs to producing food are land, water, nutrients and fertilisers, machinery and equipment, and labour. These inputs will vary depending on where the food is produced, with some benefits to producing on small urban plots, and some costs. These are outlined below:

— **High yields:** Farms in urban areas often produce higher yields than large expanses of rural land. In fact, some garden plots can be 15 times more productive than rural holdings, with one square metre producing up to 20 kg of food a year[33]. This is because there are fewer pests to contend with, plants can be placed at a higher density due to hand cultivation, and the smaller plots can be managed more intensely by farmers. The same trend is seen for smaller farms in rural areas.

Farms in urban areas often produce higher yields than large expanses of rural land.

— **High costs of production**: Land is one of the largest inputs into food production, and, given the much higher cost of urban land and competing land uses, is a critical constraint in urban agriculture. Box 3 explores what kinds of urban land are most appropriate. The small scale of production also makes the procurement of both efficiency-enhancing capital (such as harvesters and tractors) and operational inputs (such as fertilisers and pesticides) difficult and more expensive. Farmers often also don't benefit from tariff subsidies that rural producers might have, for example water or electricity tariffs.

— **Water contamination and food safety:** Reliable access to clean water in cities is one of the main constraints in running an urban farm, and in poorer areas this often results in farmers using water contaminated with heavy metals or sewerage to grow their produce, which results in spoiled or lower quality goods. Food grown in urban areas can also be contaminated through pollution and smog, for example exhaust fumes from a nearby motorway. Keeping farmed animals in the city in close proximity to residential areas also heavily increases the risk of zoonoses, or disease transmission from animals to humans.

— **Stock theft:** Vandalism and theft of food is common in urban farms, likely due to the high density of people and the fact that urban farms are often situated in poorly policed and insecure areas.

33 FAO, 2012. Growing greener cities in Africa. First status report on urban and peri-urban horticulture in Africa. Rome, Food and Agriculture Organization of the United Nations.

BOX 3: WHAT LAND OR SPACE IS VIABLE FOR URBAN AGRICULTURE?

Given the vital importance of land in agriculture, the type of land used is a critical determinant of the success and profitability of food produced. It is not only the price of land that needs to be considered, but also the opportunity cost of cultivating that land. In other words, what else could this land and other resources have been used for? There are two key reasons that urban land is not well-suited for cultivation:

High cost of land: One of the primary and most obvious issues with urban agriculture is the market price of land. Urban migration and competing land-uses both increase the demand for urban land, thus driving up the price. In most cases, income derived from food production in the city will not cover the costs of urban land, and subsidising this land creates perverse incentives for urban development.

Locks in land-use patterns and impedes development: Even in cases where land is left unutilised, for example due to an absence of clear property rights, using that land for urban farming could restrict those property rights being clarified and may impede using them for critical urban infrastructure or housing which may be of greater public benefit overall.

However, there are cases where using scarce urban land for urban agriculture does makes sense:

Adding value in underutilised space: Land that is under-utilised or not suitable for development, such as marshland or land below powerlines or the side of highways, can be productively utilised for farming in the city. Surfaces of existing developments are also often used for urban agriculture, namely vertical and rooftop gardening. Urban agriculture is also a great long-term solution for land rehabilitation, for example dump sites, mining quarries or abandoned buildings.

Niche produce that covers market-related rents: Land where the produce can cover market-related rents could of course be used for urban agriculture. These are often limited to niche high-value goods such as mushrooms or berries, and produced in a warehouse using technological innovations for a high-end market within the city.

In more developed cities, urban agriculture has contributed to gentrification of neighbourhoods, both as a result of the neighbourhood greening effect it has, and the demand of relatively wealthy residents for organic and locally produced food. This also needs to be considered when assessing the overall impact of promoting urban agriculture.

BOX 4: URBAN AGRICULTURE IN SECONDARY CITIES

The production of food in cities becomes more viable in secondary or less-developed cities two key reasons:

Land is more affordable and plentiful. As highlighted above, in the capital city of Nairobi, average land sizes devoted to UA are around 0.53 acres in the urban areas and 1.44 acres in the peri-urban areas.[34] This is compared to secondary cities where average land sizes under UA are much larger – 1.98 hectares in Tamale, Ghana and 2.87 hectares in Ouagadougou, Burkina Faso.[35]

Secondary cities play a connecting role between rural and urban areas. Many people who live in secondary cities are originally from rural areas and still value and retain the skills of farming practices. Furthermore, they can play a stronger role in developing aggregation and distribution networks. In Tamale, UA contributes between 20% and 67% of total household food requirements.[36]

Distribution and aggregation

One of the major limitations of food systems in lower-income countries is the lack of critical transport infrastructure connecting rural and urban areas for distribution. In some cities, especially the coastal cities, it is cheaper to import food, rather than transport it from the rural countryside.[37] Urban agriculture overcomes some of these challenges, while reinforcing others:

— **Closer to market:** By reducing the distance between food production and the market, urban agriculture reduces the high costs and price volatility associated with distribution, storage, and logistics. It also reduces food waste that occurs throughout the value chain.

— **Resilience to shocks:** With localised production and distribution at a sufficient scale, the city is more resilient to outside shocks that affect trade or the movement of goods.

— **Distracts from rural connectivity:** Rural agriculture, and the transport infrastructure that connects cities, towns, and rural areas, is essential for national food security, and therefore focussing on growing food closer to towns and cities does not help in solving this long-term challenge.

34 Republic of Kenya, (2018). County Annual Development Plan (CADP), 2017/2018. Government Printers, Nairobi.

35 Bellwood-Howard, I., Häring, V., Karg, H., Roessler, R., Schlesinger, J. and Shakya, M., 2015. Characteristics of urban and peri-urban agriculture in West Africa: Results of an exploratory survey conducted in Tamale (Ghana) and Ouagadougou (Burkina Faso). IWMI Working Paper 163. Colombo, Sri Lanka: International Water Management Institute, 30pp.

36 Ibid.

37 Cago, L., 2016. Countries Most Dependent On Others for Food. Accessed August 4, 2021.

— **Small scale:** As mentioned above, the lack of scale in urban agriculture means that cooperatives are essential in achieving levels of aggregation in both inputs and outputs to reach larger markets. Urban farmers struggle to produce a consistent quantity and quality of food that retailers and consumer's desire.

Food processing, markets, and purchasing

Given the inability to produce at scale, urban farmers tend to produce for their own consumption, local markets stalls, or niche markets. Goods produced can be both cheaper in the case of personal consumption or local market stalls, or more expensive in the case of production of organic goods or niche products – speaking to the duality of urban agriculture as a subsistence and commercial activity.

The production of food in cities becomes more viable in secondary cities where land is more affordable and plentiful. They also play a critical connecting role between rural and urban areas.

— **More localised and niche produce available for consumers:** Niche markets and demand for organic or locally produced goods can be served more effectively with urban agriculture – including for goods that require production in a climate-controlled environment such as a greenhouse or warehouse.

— **Lacking quality assurance:** Labelling and standardisation of products grown in urban farms is usually less advanced, which can sometimes be a concern for consumers who want a guarantee of food quality and safety

Resource and waste recovery

Around the world, roughly one third of all food produced is wasted, amounting to around US$310 billion in developing countries alone – with a knock-on effect on prices.[38] In developing countries, food waste tends to occur in the early stages of the food value chain (production and distribution) rather than in consumption, underscored by financial, technical, infrastructure, and cool storage constraints. This highlights the importance of developing a robust urban food system that limits waste of both the resources needed to produce food and the food itself.

— **Less food waste:** With urban agriculture, food does not travel as far, resulting in less needs for storage and reduced processing, and therefore less waste along the supply chain. This also plays an important role in reducing carbon emissions.

— **Promotes the circular economy:** Organic waste is composted and used as an input to grow new pants. This can be done locally meaning the organic waste/compost does not need to be transported over large distances.

— **Reduced use of inputs:** Smaller sized farms mean greater precision in the application of inputs such as water, fertiliser, and pesticides, reducing their overall use.

— **Groundwater pollution:** The run-off of chemicals and fertilisers used on plants can impact on the quality of the water supply of the city, which in turn affects produce.

38 UN Environment Programme. Worldwide food waste. https://www.unep.org/thinkeatsave/get-informed/worldwide-food-waste

BOX 5: WHAT MAKES URBAN AGRICULTURE MORE ECONOMICALLY VIABLE?

Given the space constraints in urban areas, crops that are well-placed for urban agriculture often include crops that (1) require little space, and (2) have short production cycles. For example, under a hydroponic system, just 1 metre square can yield 9 kg of lettuce in 3 weeks, 29 kg of tomatoes in 9 weeks, 6 kg of cucumber in 6 weeks, or 8 kg of brinjals in 9 weeks. At the same time, 1 cubic metre of water can produce between 100-300 kg of fish in 6 months.

Niche crops that yield high revenues that can cover the higher costs of urban land are also more suitable for commercial urban farms. These could include certain 'heirloom' varieties of fresh produce, berries, mushrooms, microgreens, or medicinal herbs like cannabis. Produce that doesn't transport well is also better suited, including meat and dairy which requires cold storage, and benefits from being located on the urban edge.

Methods that increase profitability include:[39]

- Planting densely
- Crop rotation
- Season-extension methods and covered farming technologies
- Sustainable practices such as agro-ecology and organic farming
- Precision agriculture and irrigation technologies
- Waste-to-soil
- Improved seed varieties
- Creating cooperatives

How can local governments support effective implementation of urban agriculture?

Considering the trade-offs outlined above, and the organic growth of farming in our cities, proactive policy is needed to ensure the benefits of urban agriculture outweigh the costs. First, cities need to be clear on what they want to get out of urban agriculture and whether it is the best tool to achieve those outcomes. Second, they need to understand how to manage and leverage urban agriculture for the best possible results, and in doing so, re-think traditional modes of urban planning and development. Commonly found barriers include lack of access to land, safe water for irrigation, access to capital and credit, training and extension services, and supportive legislation.[40]

Around the world, roughly one third of all food produced is wasted, amounting to around US$310 billion in developing countries alone.

39 Shai, T., Maseko, S., and Basson, L., (2021). Market Brief: Green technologies for urban food production. Greencape, Cape Town.

40 World Bank, (2013). Urban agriculture: Findings from four city case studies (English). Urban development series knowledge papers, no. 18 Washington, D.C.: World Bank Group.

Access to land: The rapidly growing urban population and the need for land for residential and industrial purposes is reducing the open spaces available for agriculture, even in the peri-urban areas. This is primarily a good thing – as cities densify and grow in a well-manged way, they become more productive and sustainable. However, we need to ensure that adequate 'green' space remains, and that land that is not suitable for building can be leveraged. Where urban agriculture does take place, most farmers do not own the land on which they farm and cannot undertake heavy investments because of the insecure tenure. City governments could take the following steps to address this[41]:

1. **Take stock of all suitable land** in the city, including marshland, vacant lots, and public lands around schools and hospitals that could be used for some form of production, as has been done in Dar es Salaam and Kampala. Some sites may be more amenable to certain types of production, such as flowers rather than food.

2. **Get access to this land** by first establishing clear and well-communicated land-use regulations and processes, as well as collaboration between different spheres of government to make public land available.

3. **Develop tenure regulations** for urban agriculture such that farmers can feel secure in utilising land. Conditions could also be placed on certain land, for example that it can only be used until construction begins in a certain number of years, to maintain flexibility and optimal urban land uses as the city grows and develops. Box 6 shows how failure to do this can negatively impact all forms of development.

BOX 6: LAND CONFLICT IN THE PHILIPPI HORTICULTURAL AREA, CAPE TOWN[42] [43]

The Philippi Horticulture Area in Cape Town, a 3000-hectare farming area just 20 minutes from the city centre, has historically been an area of food production dating back to the 1800's, and still produces a substantial portion (over 50%) of the fresh produce sold in both formal and informal markets in the city today. It plays it critical role in the local food system, where prices are 3-9% lower than the national average. Uniquely located above an aquifer, this city land is well-suited to agriculture, however, it is also being encroached upon by rapid urban expansion, with many keen to develop it for much needed housing, industry, and infrastructure. Some developers have even bought land, leaving it to lie fallow as they speculate the outcome of court hearings to convert the land from rural to urban use. The lack of government clarity on the protection of agricultural land in the city, combined with fragmented governance structures for managing it, have meant that large tracts are neither being developed for housing or industrial use, nor for agriculture.

41 Mougeot, L.J., (2006). Growing better cities: Urban agriculture for sustainable development. IDRC.

42 Battersby-Lennard, J., and Haysom, G., (2012). Philippi Horticultural Area. AFSUN and Rooftops Canada Abri International, Cape Town and Toronto.

43 Sullivan, H., (12 October 2016). The urban farms that grow half the vegetables eaten in Cape Town. How we made it in Africa.

Access to space: Building on the point above, many urban agriculture activities do not require land to be successful.[44] Rooftops and walls, for example, can be used for growing. However, legislation often does not allow urban dwellings to be utilised in this way, requiring the revision of building codes and regulations to encourage this optimal use of space where safety and structural concerns are met. Of course, urban agriculture that requires the use of factory space should ordinarily be allowed if production can cover market related rents.

Safe water for irrigation: Many developing cities struggle with the sufficient supply of clean water, and in most cases this water is not adequate for industrial and domestic use. This means that many urban farmers resort to using untreated wastewater for farming which may be harmful to consumers if the water is contaminated. To overcome this, waste-water treatment technologies have successfully been used for urban agriculture in Jordan, Peru, and Senegal.[45] Building codes could also be adapted for recycled greywater systems and boreholes, alongside private investments in drip irrigation systems or drought resistant seed varieties. However, simpler methods, such as educating farmers around matching quality of water to the type of crop and watering the roots rather than the leaves can also have the intended outcome.

Access to capital and credit: Like other small farmers, urban and peri-urban farmers are not well catered for by formal financial systems. Urban farmers typically rely on informal loan arrangements which are limited in amount and not reliable. Including urban agriculture as a land-use category in formal planning would make it easier for farmers to access finance and technical services, with security of tenure lowering the risks involved and acting as a form of collateral.

Training and extension services: Urban farming requires specialised skills and technologies. However, because urban farms are usually not officially recognised in policy, they are not able to access the requisite training and extension services, such as the productivity enhancing agronomic techniques often offered to rural smallholders. In a World Bank study from 2013, for example, only 9% and 5% of urban farmers accessed extension services in Nairobi and Lima, respectively.[46] There is however mixed evidence on the efficacy of extension services and the factors that make it a success[47], and so more research is needed in the urban context to ensure it is implemented in a way that provides value for money.

In some cases, rather than specialised training, it is simply awareness that is needed. Communication campaigns and field demonstrations of urban gardens are a useful way of showcasing potential and motivating citizens and politicians for behaviour change. These could even be designed as a competition to increase buy-in.

Legislation often does not allow urban dwellings to be utilised for farming, requiring the revision of building codes and regulations to encourage this optimal use of space where safety and structural concerns are met.

44 Mougeot, L.J., (2006). Growing better cities: Urban agriculture for sustainable development. IDRC.

45 Ibid.

46 World Bank, (2013). Urban agriculture: Findings from four city case studies (English). Urban development series knowledge papers, no. 18 Washington, D.C.: World Bank Group.

47 Anderson, J. R., & Feder, G. (2004). Agricultural extension: Good intentions and hard realities. *The World Bank Research Observer,* 19(1), 41-60.

Forming cooperatives and access to markets: Bringing together groups of urban farmers is important both in reaching economies of scale and larger markets, as well as in accessing technologies they would otherwise be unable to afford by sharing it among multiple farmers. Cooperatives can make purchasing inputs, such as fertiliser and seeds, much cheaper as they can be procured in bulk. For outputs, cooperatives enable the consolidation of processing and marketing, and diversification of produce, enabling farmers to jointly meet the scale and consistency required by retailers. Cooperatives also help to combat the issue of monoculture farming – whereby commercial farmers produce only one type of crop in order to maintain supply for a particular market. By engaging in production planning, each farmer can rotate crops while the cooperative is able to maintain supply. Box 7 illustrates how cooperatives improve collective bargaining in urban agriculture.

BOX 7: COOPERATIVES RAISING INCOME FOR URBAN FARMERS IN ADDIS ABABA, ETHIOPIA[48]

The largest cooperative in Addis Ababa – the Mekanissa, Furi, and Saris Vegetable Producers Cooperative – was formed by a group of farmers as part of their own strategy to share best practices, improve tenure security, become self-sufficient, and stand together against unfair rules or practices. Although not formally recognised (limiting their ability to access finance), cooperative members have incomes that are 70% higher than those operating outside of it.

City governments can also play a role in investing in clean and safe market infrastructure for famers to connect with customers, as was done in Rosario in Box 2.

Enabling legislation: Food policies have historically been oriented towards rural areas, with cities having limited voices in how national food systems are designed and function. Furthermore, most cities lack specific urban agriculture policies – while some countries, like Zimbabwe, even completely outlaw it. Although it may not always make sense for the government to actively incentivise urban agriculture due to other vital development needs, it is equally not helpful to regulate urban farms out. Just as for other economic activities, city governments should aim to create an enabling environment for urban agriculture.

In most countries, urban agriculture tends to fall between the silos of urban development and agriculture policies, resulting in overlapping mandates between different spheres of government and misalignment in roles and responsibilities. Furthermore, policies for food security, food systems, urban agriculture, and green infrastructure are frequently siloed.[49]

48 Lee, M. (1993). Recognizing Ethiopia's urban farmers. *IDRC reports, v. 21, no. 3.*

49 Camargo Nino, E., Lane, S., Okano, K., Rahman, I., Peng, B., Benn, H., Culwick Fatti, C., Maree, G., Khanyile, S. and Washbourne, D.C., 2020. Urban agriculture in the Gauteng City-Region's green infrastructure network.

This needs to be overcome on one hand by actively considering the city as an integral part of national food security and production policies, and on the other hand by considering urban agriculture as a valid land use and economic activity within city policies and plans across all spheres of government. This collaboration and coordination should extend to other stakeholders in the space, including built environment professionals, community organisations, and NGOs.

As with all new policies, there is great benefit in **experimentation.** For example, policymakers could experiment with temporary occupancy certificates as a flexible form of tenure for individuals or groups of urban producers. Incentives could also be used to make open land available, for example taxing vacant plots and offering reductions if used for urban agriculture.[50] Box 8 highlights how urban farming has been enabled in Kampala, Uganda.

Bringing together groups of urban farmers is important both in reaching economies of scale and larger markets, as well as in accessing technologies they would otherwise be unable to afford by sharing it among multiple farmers.

BOX 8: ENABLING URBAN FARMING IN KAMPALA[51]

Kampala Capital City Authority (KCCA), through its Ordinance of 2006, recognises urban agriculture and promotes it as a means of improving livelihoods and cinomes of city dwellers. The Authority has agricultural extension staff in all five Divisions providing input on agriculture and agribusiness, animal production, and fisheries and aquaculture. At Kyanja, the Authority has established an Agricultural Resource Centre, which has model farmers to facilitate farmer training and demonstrate urban farming technologies and production of farm inputs. Around 30 new farmers are linked up with every model farmer

At the same time, between 2012 and 2017, the National Agricultural Research Organisation (NARO) promoted backyard gardening innovations (BGI) in the urban and peri-urban areas of Kampala. Around 98% of the target households adopted at least one of the innovations promoted. Recycled bags and raised beds were the most popular innovation, having been adopted by 68% and 67.7% of the households, respectively. Other innovations included food towers (42%), wooden boxes (35%), and greenhouses (4%). Vegetable production also become more diversified, and access and consumption of vegetables increased.

By increasing the availability of relatively cheap and accessible technologies that many households were not aware of, and implementing supportive policies to promote innovation, households had remarkable outcomes in urban farming for livelihood improvement.

50 Mougeot, L. J. (2006). Growing better cities: Urban agriculture for sustainable development. IDRC.

51 Sanya, L.N., Magala, D.B., Mugisa, I.O., Namirimu, T., Mutyaba, R., Muyinda, M., and Akello, B.O., 2020. Backyard Gardening Innovations: Towards Enhanced Vegetable Consumption for Nutritional Security among Urban and Peri-urban Dwellers in Central Uganda. A paper presented at Tropentag Conference, September 9-11, 2020.

Conclusion

Agriculture, given its benefits of scale and specialisation, will always be a primarily rural phenomenon. However, while UA is unlikely to drive down food prices or substantially expand the supply of food, it can provide several social and environmental benefits, including community cohesion, dietary diversity, urban greening and ecosystem services, and resilience to shocks. Urban agriculture can also be a viable economic sector, but usually only for speciality goods produced for a high-end market. The contribution may be contextual – high in some geographical areas and low in others, larger for some households or agricultural systems and low in others – but it is more likely to be viable in secondary cities or on the urban edge.

Unfortunately, urban agriculture falls between the two pillars of agricultural and urban development policies. As such it is mostly unregulated, unrecognised, and receives little public policy attention. While urban agriculture should not be actively subsidised without a clear cost benefit analysis, it should not be outlawed either – UA needs to be enabled to ensure the short-term benefits of community resilience are realised whilst avoiding the long-term costs of inefficient land-use and contamination of food. Without this, the proliferation of urban farmers across developing countries will continue to face unnecessary additional risks, while at the same time inhibiting efficient land use for other activities. This should not detract from the very urgent investments that are needed in transport infrastructure to enhance the connectivity to rural farms to achieve long-term food security.

There is a plethora of initiatives that governments could take to create an enabling environment for the urban farmers to thrive. This includes providing secure access to underutilised urban space, improving market infrastructure, strengthening the capacity of the urban farmers through extension services, improving access to credit, and supporting the formation of cooperatives for aggregation and collective bargaining. Further, measures to ensure food safety, such as access to safe irrigation water, should be put in place to avoid urban farm products and neighbourhoods becoming contaminated. Most importantly, they should mainstream UA into urban land-use policies and regulations to ensure clarity of mandates and safety and security for those working in the sector. Overall, much more research and evaluations are needed to draw concrete conclusions on what works and what doesn't – and on the broad-ranging impacts of enabling the sector.

FURTHER READING

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