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Regional: Advancing Inclusive and Resilient Urban Development Targeted at the Urban Poor

Urban and Peri-Urban Agriculture for Strengthening Pro-Poor Resilience in Asian Cities: Investment Needs and Opportunities

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For the Asian Development Bank

Asian Development Bank

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Abbreviations

ADB	Asian Development Bank
CFP	City Farm Program
CODI	Community Organizations Development Institute
COVID-19	corona virus disease
FAO	Food and Agriculture Organization
HLPE	High-Level Panel of Experts
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
LMIC	low and middle income country
MFI	microfinance institution
MSW	municipal solid waste
MUFPP	Milan Urban Food Policy Pact
PAU	Programa de Agricultura Urbana (Urban Agriculture Program)
PRC	People's Republic of China
RUAF	Global Partnership on Sustainable Urban Agriculture and Food Security
UPA	urban and peri-urban agriculture

Chapter 1: Background to the Report and the Pro-Poor Urban Resilience Context in Asia

1.1 Background

This report responds to several trends in Asia and the Pacific which have been increasingly recognized in the region. Together with rising urban poverty, the number of urban residents facing food and nutrition insecurity is increasing despite spending the majority of their earnings on food purchases. The COVID 19 pandemic has added greater stress to urban food systems and the vulnerability of low-income urban populations. At the same time, there is increased recognition that urban agriculture can be part of the solution to urban food insecurity, complementing other food supplies, thus, increasing urban resilience for the poor. However, there are several barriers that may impede the scaling of urban agriculture opportunities to contribute to urban resilience.

As part of broader efforts to improve the capacities of governments to design and implement resilience-building investments targeted at the urban poor, an overview study based on desk review and consultation with stakeholders was undertaken to:

(i) make the case for urban agriculture for strengthening climate resilience of the urban poor;

(ii) capture global good practices on the topic;

(iii) articulate the challenges and barriers for scaling up urban agriculture to address climate resilience of the poor; and

(iv) provide recommendations on the opportunities and strategies for scaling urban agriculture;

The report first provides some regional context in terms of urbanization trends and food security challenges. It also clarifies the meaning of "urban agriculture" and the meaning of urban resilience, which are used in this report. Chapter 2 provides evidence from the literature about the critical importance of urban agriculture and the broader urban food system for the food security and livelihoods of the poor and its contribution to climate resilience of cities through strengthening the circular bioeconomy. Chapter 3 provides two city case studies where good practices on urban agriculture have contributed to increased resilience of poor members of these cities. Chapter 4 reviews the challenges and barriers that will confront efforts to scale the kinds of good practices identified in Chapters 2 and 3, ranging from conversion of land, competition for water, social exclusion, health and environmental challenges to issues of weak planning and governance. Chapter 5 presents a number of strategies through which these challenges can be met and the potential of urban agriculture to contribute to urban resilience realized. By way of conclusion, Chapter 6 offers brief ideas and suggestions for the kinds of actions and interventions that ADB could make to support these strategies across the Asia and the Pacific.

1.2 Cities, Urban Resilience, and the Potential of Urban Agriculture: The Asian Context

The number of people in the world affected by hunger increased in 2020 under the shadow of the COVID-19 pandemic. The Food and Agriculture Organization (FAO) estimated that between 720 and 811 million people in the world faced hunger in 2020 (FAO 2021). There is a **triple burden of malnutrition**: underweight, hidden hunger (a deficiency in micronutrients), and overweight, which co-exists in Asian countries. Compared with 2019, almost 57 million more people in Asia, were affected by hunger in 2020. Nearly one in three people in the world (2.37 billion) did not have access to adequate food in 2020. Shifting to healthy diets that include sustainability considerations can contribute to reducing health and climate change costs by

2030, because the hidden costs of these diets are lower compared with those of current consumption patterns.

In relation to urban food policy, Asia is lagging behind other regions (Acharya et al. 2020; Tefft et al. 2020). The neglect or delay of urban food policies is setting up many Asian cities, unknowingly, for needless setbacks and missed opportunities on a large scale. The ultimate success of Asian cities with regard to their livability, economic vibrance, resilience, and sustainability will strongly depend on their food systems' performance.

Urbanization is occurring rapidly. Over half of the world population lives in cities and by 2050 an estimated two-thirds will live in urban areas. The growth in Asia's urban population since 2000 has been greater than the entire size of Western Europe's or North America's urban population. As of 2015, Asia had an urban population of 2.11 billion, making it home to over half of the world's urban population (Acharya et al. 2020). Going forward, between 2020 and 2050, the urban population is expected to rise by a further 20 percent in East Asia, 58 percent in Southeast Asia, and 81 percent in South Asia. Urban growth and development have not been limited to capitals or even megacities. In fact, cities with populations between 500,000 and 1 million and between 1 and 5 million have been growing at a faster rate than the megacities. Another demographic consideration is the prominent role of rural-to-urban migration (Acharya et al. 2020; Tefft et al. 2020).

Urban growth, combined with limited employment opportunities in cities, is leading to a more rapid increase in poverty in urban areas than in rural areas. Some 535 million urban residents in Asia live in informal settlements. This represents 70 percent of the world's population living in slums (Acharya et al. 2020). As much as 80% of urban employment in Asia is in the informal economy. Variations in food prices and income translate directly into diminished purchasing power and rising rates of food insecurity, compromising dietary quantity and quality (Intergovernmental Panel on Climate Change [IPCC] 2022). Alongside health and economic aspects, localized food chains, including urban agriculture, can play a role in the social inclusion of marginalized groups by providing them with an opportunity to feed their families and generate an income, while also enhancing self-management and entrepreneurial capacities, women-focused interventions and offering physical and/or psychological relaxation.

Rapidly growing cities already face considerable challenges, as lack of adequate and affordable housing, limited and unequal access to drinking water, etc., while at the same time, cities are having to cope with climate change, which disproportionately affects people who live in slum and Informal settlements (IPCC 2022). Stresses and shocks, including climate change and conflict, and pandemics overlay those related to poverty, (gender) inequality, discrimination and exclusion, unplanned urbanization, ecosystem degradation, displacement, weak institutions and declining respect for human

rights. **Resilience** is the ability of individuals, households, communities, cities, institutions, systems and societies to prevent, resist, absorb, adapt, respond and recover positively, efficiently and effectively when faced with a wide range of risks, while maintaining an acceptable level of functioning without comprising long-term prospects for sustainable development, peace and security, human rights and well-being for all (United Nations 2020, p.31), and the capacity for adaptation, learning, and transformation (IPCC 2022).

Food systems contribute to about 30%–40% of global greenhouse gas emissions. About a quarter of the greenhouse gas emissions of the food system are caused by food losses and food wastes. In this regard, there is a clear need to increase the sustainability of our food systems and investigate opportunities for more localized food systems, including urban and peri-urban agriculture (UPA). A **resilient food system** is understood as: "having the capacity over time to provide sufficient healthy, sustainable and fair food to all in the face of chronic stresses and acute shocks, including unforeseen circumstances." A resilient food system is robust (it can withstand disturbances without losing food security), has redundancy (elements of the system are replaceable and can absorb the effects of stresses and shocks), is flexible, can quickly recover lost food security and can adapt to changing circumstances" (Blay-Palmer et al. 2021). A resilient food system involves diversified food supply chains, water-efficient, uses waste streams for food production, and has the capacity to create synergies and achieve multiple benefits across a range of policy objectives, and it is people-centred and inclusive.

The production and direct marketing of food in and around cities is not something new but has always been there. The concept UPA has been developed in the past two to three decades. There are various definitions, showing the dynamic and multifunctional nature of UPA. A good and often cited definition is by Mougeot (2000):

Urban agriculture is located within (intra-urban) or on the fringe (peri-urban) of a town, a city or a metropolis, and grows or raises, processes and distributes a diversity of food and non-food products, (re-)uses largely human and material resources, products and services found in and around that urban area, and in turn supplies human and material resources, products and services largely to that urban area.

In the past few years, UPA has gained increased attention. The recent food system disruptions caused by COVID-19 pandemic emphasized the importance and added value of connecting local food production and consumption, and the importance of access to healthy and nutritious food. It underlines the multiple linkages of UPA to the urban ecosystem.

There is a continuum from intra to urban and rural agriculture comprising various farming systems. This is linked to the systemic approach and to the emergence territorial concepts like that of City Region Food Systems (Blay-Palmer et al. 2021). UPA is not a temporary phenomenon (Drechsel 2022, forthcoming). However, links between urban growth and urban farming are complex and dynamic, and developments are largely location specific. UPA involves many actors, consists of many growing techniques, produces a wide variety of products, takes place in all kinds of places, and uses many organizational arrangements, serving multiple functions.

Roadside vegetable production in Metro Manila, Philippines (Photo by G. Prain).

Chapter 2: Why is Urban and Peri-Urban Agriculture (UPA) Critical for Addressing these Trends and Strengthening Pro-Poor Urban Resilience?

As the global population exceeds 50% urban, cities and their immediate surroundings are increasingly key arenas for innovative interventions to reduce hunger, improve livelihoods, and mitigate and adapt to climate change.[1] UPA offers the chance to contribute to three kinds of urban resilience:

(i) **Social**: UPA is a store of coping and adaptive knowledge that has enabled urban populations to confront natural and economic shocks and stresses and to recover. Through farming and market-related networks and community-based activities UPA contributes to enhanced food security and improved nutrition of the urban poor, especially women and children, since women are strongly represented in urban subsistence food production and marketing. UPA offers increased social inclusion within cities, especially for women and youth. Rural-urban linkages forged through UPA interdependencies increases the social inclusion of those on city peripheries.

[1] Abdullah, H. (ed.). 2019. Given the need to support our claims for the critical importance of UPA with significant evidence, a relatively large number of citations have been included in Chapter 2.

(ii) **Economic**: Through agricultural production for own consumption, UPA saves food purchases for poor households. With food purchases taking up half or more of earnings in many Asian countries (Boonyabancha and Kerr 2015), any savings are highly significant. Semi or full commercial production contributes directly to inclusive local economic development and poverty alleviation. UPA also stimulates increased employment in food marketing and processing, and in supporting services like small-scale transport, porter services, plant and animal health services, etc. In catalyzing the transition to a circular bioeconomy, UPA boosts value addition through the adoption of the "3R waste management approach" (reduce, reuse, recycle).

(iii) **Environmental**: The ecosystem services provided by UPA contribute to climate change mitigation and adaptation as well as help cities move to a circular bioeconomy. UPA services include the productive greening of cities with buffering of the urban heat island effect of up to 5°C (Dubbeling and De Zeeuw 2011), the recovery and productive reuse of urban solid and liquid wastes, creation of short value chains with lower carbon emissions, reduction of flooding risks through increased water filtration, and conservation and expansion of urban and peri-urban biodiversity.

The following sections discuss in more detail some of the ways through which UPA contributes to these different dimensions of urban resilience for the poor.

2.1 Large expanse of UPA cultivation and widespread animal raising already key components of urban food systems in Asia and the Pacific

UPA is a very important part of Asian cities already, even if this fact has not yet been widely embraced by urban governance arrangements and planning departments (see Sections 4.3 and 4.10). Almost half of global urban cropland (49%) is in Asia and 6% of all the irrigated cropland in rural and urban areas globally lies within Asian cities with greater than 50,000 population (Thebo et al. 2014). When peri-urban areas with a 20-kilometer radius around cities are included, almost a quarter of global irrigated cropland or nearly 50 million hectares, lies within urban and peri-urban Asia. Though proportionally less significant, the total area of rainfed cropland within a 20-kilometer radius

of urban areas in Asia is nearly 40 million hectares. This massive amount of UPA is still an underestimate because small marginal spaces within cities, like gardens, roadsides, and rooftops are not included. It is also an underestimate of the nourishment potential of these croplands, since they do not consider the contribution of livestock raising or aquaculture.

Although large-scale estimates of the importance of urban and peri-urban livestock-keeping as a source of income and a contributor to urban diets are more difficult to make, it is clear that the so-called "livestock revolution" (Delgado 2003) is largely driven by increasing urban demand and has resulted in a growing concentration of both ruminants and monogastrics in and around urban settlements (Gerber et al. 2005). High numbers of animals have been found concentrated in and around cities like Hanoi, Bangkok, Manila, Guangzhou and especially along the highly urbanized coastal belt between Shanghai and Beijing. Pig production tends to be closer to cities than large-scale poultry production, which requires the greater space available in peri-urban areas. Aquaculture is also heavily concentrated in or around Asian cities where growing demand exists (Bunting and Little 2015).

2.2 UPA strengthens urban food security and nutrition through local production, including under crisis conditions

Because of the high proportion of income spent on food by poor urban residents, they are vulnerable to economic shocks affecting prices and to natural shocks affecting food availability (Escaler et al. 2010; Cohen and Garrett 2010). An appraisal conducted by the poor themselves across 35 urban settlements in six Asian countries showed that almost 50% of earnings are spent on food and reinforces the difficulty of ensuring access to food (Boonyabancha and Kerr 2015). The recent COVID-19 pandemic has demonstrated urban food insecurity in a dramatic way and was a major factor in the massive exodus of poor urban residents to their rural homelands during the pandemic (Béné et al. 2021). India was a dramatic example of such urban-rural population movements (Rajan and Cherian 2021). Under these circumstances, access to own food production within urban areas clearly makes a contribution to buffering the effects of those crises in many Asian cities (Padgham et al. 2015).

A locally crafted cage for raising chickens at home as part of Kampungs communities' food security strategies (Jakarta, Indonesia) (Photo by Y. Cabannes).

Estimates across five Asian countries[2] using national household data indicated that an average of 31% of urban residents raise crops and 20% raise animals,[3] giving some sense of how many individuals and households are practicing this food security strategy. City-based assessments in the three major Asian cities of Chennai, Dhaka and Kathmandu, found in general lower levels of UPA activities than those identified from the national data, possibly indicating higher levels of agricultural activities in secondary cities (Padgham et al. 2015).

Another way of measuring the food security importance of UPA is through its contribution to urban food intake. It seems that its contribution is variable depending on geography and seasonality. Only about 10% of the very large amounts of fish consumed in Dhaka came from peri-urban areas of the city in 2014, which can be understood in the context of the intense river traffic linking Dhaka to the rest of the country, which carries fish and other foods to this major national market. The Kathmandu valley was estimated to produce 8% of the perishable vegetables consumed in the city in 2014, though it is not clear during which season. There is large scale variation in food supply between the summer production in the peri-urban hill area of the valley and the winter production coming from the accessible and fertile terai (plains) region of the country (Joshi et al. 2017). In contrast, the coastal city of Shanghai in southeast People's Republic of China (PRC) has a fertile peri-urban hinterland which was producing about 90% of vegetables and eggs around 2000 (Yi-Zhang and Zhangen 2000). In the case of the lowland city of Hanoi, in the Red River flood plain, about 50% of the pork consumed in the city is produced in the urban and peri-urban areas (Peters 2000).

There is 2015 evidence from six countries of Asia that the most cited motivation for engaging in UPA was for producing food for household consumption—and thus reducing food purchases—and the second was to earn extra income. In Hyderabad and other cities, women have a more significant role in using food from urban agriculture for contributing to household food supply and thus reducing food purchases than men, but in the same city, one household income was insufficient to survive, and women were able to take advantage of UPA for generating income through frequently selling vegetables in the market and selling milk from their homes (Devi and Buechler 2009).

[2] Bangladesh, Indonesia, Nepal, Pakistan and Viet Nam

[3] Zezza and Tasciotti 2010. Whilst most of the surveyed households farm in the urban or peri-urban areas of the target country, some may also farmland in rural areas which they commute to, especially in smaller urban settlements.

An important additional contribution of UPA to human health is the production of medicinal plants in urban gardens. Medicinal plants have been a component of homestead gardens for millennia (Panyadee et al. 2019). It has been shown that urban migration often involves the transfer of these species to urban gardens, whether within the home country or even in migration overseas (Corlett et al. 2003). This demonstrates how important these plants are for culture and health.

2.3 UPA helps diversify and expand livelihoods and jobs options in low-income neighborhoods through the urban agri-food system (production, marketing, processing).

As the situation in Hyderabad illustrates, although the production of crops and raising of animals in and around cities is important for subsistence and reducing income expenditure on food, it is often also an essential source of additional income for both women and men, and particular crops and animal products can be especially lucrative. Agriculture contributed on average 18% of total income for a sample of urban households involved in UPA in Bangladesh, Indonesia, Nepal, Pakistan and Viet Nam, with considerable variation across countries and without indication about areas cultivated or numbers of animals raised (Zezza and Tasciotti 2010). In peri-urban areas of Dhaka susceptible to monsoon flooding, households raise vegetables in the dry season and engage in fishing during the monsoon floods, with both activities contributing to income (Craig et al. 2004; Rahman et al. 2014).

The ability of UPA to contribute to urban resilience in confronting stresses and shocks was highlighted during the COVID crisis. There was increased demand for local food supplies as long-distance food transport became severely affected and this offered expanded markets for local producers. In the PRC, an organization promoting community-supported agriculture reported a 300% increase in demand for local food products at the height of the COVID-19 crisis (International Network URGENCI 2020).

As a commercial option, UPA has a comparative advantage over rural farming due to its proximity to urban consumers and lower transport and cooling costs, which is particularly important for perishable products (green vegetables, milk, eggs, etc.) and in places where roads and other infrastructure such as cold chains are poor. In Metro Manila, a key part of the agricultural sector involves what is known as “subdivision farming,” the use of so far undeveloped vacant lots within new subdivision housing developments for temporary vegetable

production (De Guzman 2017). These vegetable plots are cultivated by both women and men, often members of the same households who share the work and are primarily grown for commercial sale to local wet markets in the capital region or to supermarkets. Because of their convenient location, it is common for traders to go to these subdivisions before harvest to bid for the vegetable products. A spill-over benefit of this form of UPA is the so-called "beautification" of these empty lots, which otherwise become dumping grounds for domestic refuse.

In Bengaluru, India, agriculture was found to be the main economic activity for three quarters of the peri-urban population (5-kilometer radius) of the city in 2011 (Prain and Dubbeling 2011). The income from agricultural activities pushed almost 85% of this population above the poverty line. For urban residents involved in raising crops in Bengaluru, 32% identified this activity as their main source of income and 12% identified livestock raising as their main income source. As in the case study of Hyderabad, women are as actively involved as men in production and sale of products. In addition, women also processed excess production into higher value commodities, such as pickled vegetables and preserved fruits.

The most common main source of income for those involved in agriculture and those not farming in Bengaluru was 'petty trading', and as we know from studies by both FAO and the ILO (FAO 2007), this is a major source of informal employment throughout low-income urban areas of Asia. A large part of this activity involves vending of fresh, processed and cooked food, including the sale of own fresh or processed food products, in local markets. In Bengaluru, as in other Asian cities, these activities are most frequently undertaken by women. This also happens in peri-urban Hanoi, where enterprising women market their own and their neighbors' vegetables in inner city markets after a long, overnight cycle ride from peri-urban areas (Wijk et al. 2006). In Bangkok, according to a recent assessment, there are 311,000 informal market traders and street vendors, with 116,000 involved in street food marketing. Sixty percent or 70,000 of these workers are women, showing just how important this sector is for female employment (Poonsab et al. 2019).

The closely interconnected food supply chain linking local and regional food production and urban food marketing is the source of a very large number of jobs contributing to poverty reduction and increasing urban resilience. These jobs exist not only directly in production and vending, but also in ancillary activities linked to food production and sale, including transport using bicycles, tricycles and motorbikes, portering in wholesale and retail markets, and organic waste recovery, reuse and recycling (Drechsel et al. 2015). It is estimated that there are between 13 and 56 million people working in informal waste management in selected cities of the PRC and India, and in other cities of the Global South, with a very high proportion in Asia (Kaza et al. 2018).

Because organic materials are the primary component of waste in low-income countries, this means that as many as 15 to 20 million may be involved in organic waste recovery and reuse in Asia.

2.4 Expanding climate change resilience and the circular bioeconomy of Asian cities through UPA ecosystem services

The recovery, reuse and recycling of organic solid and liquid wastes also increases urban resilience through expanding the circular bioeconomy of cities and contributing to climate change mitigation and adaptation.

Municipal solid waste (MSW) management is one of the most common services provided by local governments throughout the world (Hoornweg and Bhada-Tata 2012), but it continues to be one of the major problems facing low-income urban administrations where organic wastes are the most prevalent. The first step in addressing MSW is to reduce the production of it in food marketing, processing, catering and consumption habits (Senanayake et al. 2021). Next is recovery, reuse and recycling, and UPA contributes significantly to these steps. Across many cities of Southeast and East Asia, millions of tons of organic wastes, including crop by-products, and restaurant and processing wastes, are fed to pigs, mostly in an informal process involving direct use or ensiling of crop by-products and private collection, transport and cooking of food and processing wastes (Dou et al. 2018; Cesaro et al. 2019). This widespread informal practice delivers nutritious feed to animals (Rejeh et al. 2021), but represents a fraction of the estimated 1.3 gigatons of food waste generated annually at a global scale, with a huge proportion in Asia (91.4 million tons in the PRC alone) (Rejeh et al. 2021; FAO 2013). There is great potential for safe expansion of this practice which will be discussed in Chapter 5.

Although organic MSWs have a relatively low level of plant nutrients, they are still recycled into valuable agricultural inputs as soil conditioner, which is often of major value for urban soils with low organic matter (De Bon et al. 2009). When enriched with animal manure they are also an important organic fertilizer, which is another example of the circular benefits provided to cities through recycling of MSWs and animal wastes. Large-scale composting at municipal level or through public–private partnerships have emerged in Bangladesh, Thailand, India, and the PRC (Visvanathan et al. 2007), as well as in the Philippines and can be models for other countries.

Given the widespread depletion of water resources affecting Asia, including surface water in urban areas (World Water Assessment Programme, United Nations 2018; Flörke et al. 2018), the use of wastewater for agriculture is perhaps one of the major contributions of UPA to the circular bioeconomy. It is estimated that currently 65% of irrigated urban cropland uses diluted or raw wastewater, equivalent to 36 million hectares (Thebo et al. 2017). Approximately 80% and 70% respectively of irrigated urban cropland in South Asia and East Asia is likely to be using wastewater. The importance of wastewater use for food production is undoubtedly a key component of urban resilience, though there are occupational health and food safety issues that need to be addressed and solved, and these are discussed in Chapters 4 and 5.

The urban ecosystem services contributed by UPA through waste recovery and reuse also contribute to climate change mitigation and adaptation. Organic waste recovery and reuse reduces the amount of organic solids dumped into landfills, with subsequent production of methane. Local food production reduces the emissions resulting from long value chain transport systems supplying food to urban populations in Asia. These are a minor part of the emissions created by agriculture, but still account for a large volume of greenhouse gases. There are also reductions in cooling, storage, processing and packaging, all of which generate further emissions. Local food production also facilitates the cyclical processes linking urban domestic and industrial sectors to food production through use of excess heat, cooling water or CO_2 from industry for greenhouses (Dubbeling and De Zeeuw 2011).

Other ecosystem services generated by UPA have also enabled cities to adapt better to climate change. Agriculture and forestry in urban areas increase water filtration, which helps with flood regulation. By providing a buffer area in wetlands and other vulnerable areas, preventing construction in those locations, UPA and forestry reduce erosion and other types of flooding risk. UPA also contributes to the conservation of urban biodiversity and stimulates pollination processes (UN Habitat 2009; Lwasa et al. 2014). A critical adaptive contribution of UPA is to reduce the well-documented 'heat island effect' of cities (Kotharkar and Bagade 2018). Green productive spaces and urban forestry can buffer temperatures by as much as 5°C (Dubbeling and De Zeeuw 2011).

UPA also provides cultural and social services, spaces and activities that enhance well-being, the livability of cities, and also education about crops, animals and food (De Zeeuw et al. 2011).

CHAPTER 3. The Critical Contribution of UPA to Pro-poor Urban Resilience: Two Examples of Good Practices

3.1 Bangkok City Food Program

Background

The Bangkok City Farm Programme (CFP), publicly funded, has provided support since 2010 to a broad spectrum of urban agriculture related local activities (See further details in Appendix 1). Its implementation through a network of partners institutions and coordinated by a lean staffed Thailand Sustainable Agriculture Foundation (http://sathai.org,Thai Language only), has permitted reaching out and supporting hundreds of grassroots, through small financial grants, training and awareness raising activities. One of its uniqueness lies in its quite high cost–benefit ratio, high level of efficiency, capacity to raise urban agriculture profile in the city and national agenda, women empowerment and strengthening urban farmers' resilience in cases of floods or COVID-19, facilitating their access to nutritious food (Boossabong 2018).

The CFP supports collective food production in community and institutional gardens and provides training and knowledge transfers. It was able to consolidate six training institutions and a mobile training unit; organize monthly markets that operated through delivery during COVID-19; organize annual urban agriculture festival; It also carries out campaigning and advocacy through social media and website; constantly expands its network towards public sectors, NGOs, research units, schools, hospitals, restaurants and hotels; and more recently promotes land sharing to increase its access to land.

Some salient CFP benefits, achievements and lessons learned

- **Promotion of different types of urban agriculture**

A salient aspect of CFP relates to the promotion of multiple types of urban agriculture and their combination:

(i) *Subsistence-oriented urban farming practices*: Building community gardens as edible social space and promoting community gardens as self-sufficiency economic practices among community members/ workers.

(ii) *Leisure and recreation-oriented practices*: Creating community and institutional gardens as healthy and enjoyable learning spaces: for instance, new playground for urban kids.

(iii) *Market oriented practices*: Promoting alternative markets and support to market-oriented farms, green restaurants, fairs and markets.

One key less is CFP capacity to bridge a 10 million+ Metropolitan scale with decentralized urban agriculture activities of all types (green markets, different types of urban agriculture, rooftop gardening, specialized training, etc.)

- **Gender perspective and women's role.**

The Bangkok City Food Program supports collective food production in community and institutional gardens, including training and knowledge transfers. (Photo by Y. Cabannes).

CFP illustrates how urban agriculture can be conducive to empowerment of women and factor of change in gender patterns. Women do play a main role in its management and coordination: SAF director and CFP coordinator are both women and women are in charge of key intellectual tasks such as planning, organizing meeting and accounting; at the same time, about 70% of urban agriculture projects coordinators are women. To be noted here that women introduced the term coordinator instead of "leader" in order to stress the horizontal, collaborative and peer to peer approach promoted by CFP as a whole.

- **Bridging local food farmers and actors with central, metropolitan, and district governments.**

One of the programme's achievements has been its capacity to remain deeply grounded in local networks, grassroots and urban farmers practices, and in parallel link up with some district municipalities (e.g., Laksi) and until recently Bangkok Metropolitan Administration (Boossabong 2012).

- **Raising awareness on the importance of local food production in relation to carbon footprint.**

In coordination with CFP, Chiang Mai University developed an innovative mapping method, called food journey that identifies the distance covered by key commodities consumed in the city and assess their carbon footprint and energy consumption. These data are then used to raise awareness among the public and local governments and advocate for more localized food production.

- **Providing food for the most vulnerable people during disasters.**

Another unique aspect of the food programme lies in its capacity to increase food resilience of the most deprived and to function as a food safety network in crisis situations, primarily dramatic floods and health pandemics (Bangkok Post 2020).

- **Twenty years perspective to shift scale and evolutionary planning.**

The Alternative Agriculture Network (AAN) was founded in 1999 (CFP launched in 2010), highlighting the resilience of the process though time and the long time it takes to shift from a pilot to more ambitious prospects. CFP highlights as well the importance and the way to gradually connect multiple actors and institutions; different scales (from growing food on balconies to urban voids, under railways, etc.), and different urban sectors: health, waste recycling, green fairs, etc. As such, it is a good example of what food planning is about.

3.2 The Urban Agriculture Program and the Green Belt Program in Rosario, Argentina

Rosario is a secondary city in Argentina with of over one million inhabitants, 300 kilometres northwest of Buenos Aires, and strongly influenced by the capital city economy. When Argentina's economy collapsed in 2001 and more than half of its population dropped below the poverty line, the Municipality

of Rosario responded with the Urban Agriculture Program (or PAU: Programa de Agricultura Urbana). The Municipality of Rosario teamed up with a local nongovernmental organization, the Centro de Estudios de Producciones Agroecológicas (CEPAR) and a national program, Pro Huerta, which supports family gardens.

As part of the PAU, low-income residents have been given access to underutilized and abandoned public and private land to cultivate food, and spaces are created throughout the city for several permanent and pop-up markets. Originally intended to alleviate food scarcity and to provide economic opportunities, over the years the program evolved into a cornerstone of inclusive climate action planning. The PAU of the Municipality of Rosario won the 2020–2021 Prize for Cities,[4] which spotlights innovative approaches to tackling both climate change and urban inequality.

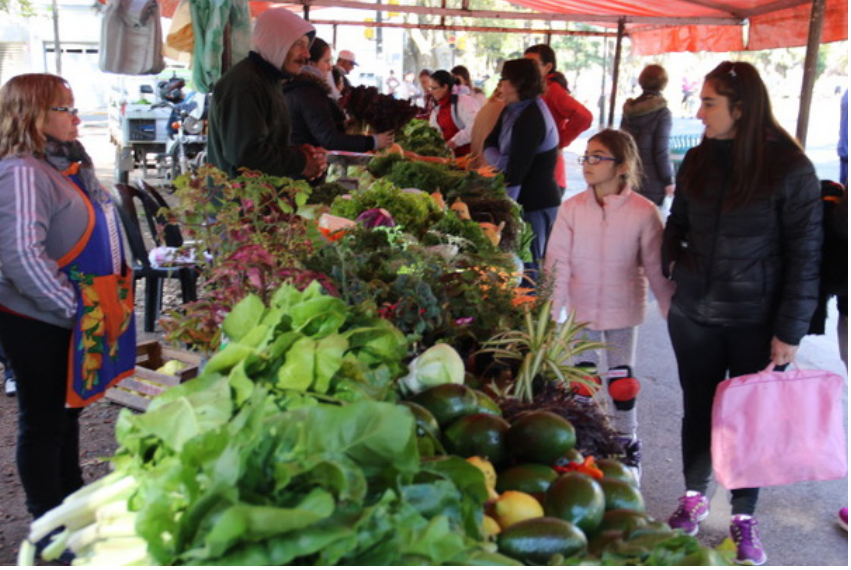
An important approach of the city of Rosario, was to reserve underutilized and degraded land for urban agriculture which shows that the goals of density and equitable urban development can be compatible and mutually beneficial. PAU consolidated UPA as a legitimate urban land use and a strategy for social and local economic development, through several planning measures, including designing use of different public spaces. New forms of urban Land use were supported on land that was in poor condition.

Rosario included space for home and/or community gardening in new public housing projects and slum-upgrading schemes. Housing design and plot regulations included (micro) farming requirements, such as grey water recycling in building design; growing on exterior walls and balconies to maximize solar access; or flat roofs that are designed with enough structural integrity and mechanical servicing to accommodate the use of an agricultural rooftop garden or greenhouse in the future.

The municipality has expanded UPA into public spaces, schools, marketplaces and a variety of social programs, especially those for youth and elderly, establishing a culture around food production. Vegetable garden parks in low-income communities were vehicles for change, closely linked to (other) social programs. UPA became an alternative income source, both by saving money by growing their own food, as well as by selling surplus crops. PAU commercialization support included the identification of various selling points and supporting the formation of the Network of Urban Farmers (Red de Huerteros y Huerteras).

Besides giving people jobs and new sources of livelihood, PAU also provided important climate benefits. The Global Partnership on Sustainable Urban

[4] See WRI website: https://www.wri.org/news/release-prize-cities-awarded-rosario-argentina-improving-resilience-and-equity-through-urban



Urban farmers' organic food market in Rosario, Argentina. Through its 20 years of existence, the urban agriculture program, active along the whole food chain, has allowed hundreds of men and women to improve their livelihoods and provide healthy food for this city with 1 million inhabitants. (Photo by Social Economy Secretary, Rosario Municipality)

Agriculture and Food Security (RUAF)[5] supported a study on using UPA in reducing urban heat island, using food transport, and using green infrastructure to reduce the impact of flooding. The municipality created the "Green Belt Project," a new land use ordinance in 2015 that permanently designated 800 hectares of peri-urban land to be used for agroecological fruit and vegetable production. The Rosario Municipality included new areas for peri-urban agriculture in their city development plan, and included a new land use category 'land used for primary production.' Across Rosario, 75 hectares of land are now dedicated to agroecological production and urban gardens, with another 800 hectares preserved for agriculture in the peri-urban area. Localizing vegetable production created 95% fewer greenhouse gas emissions, while Rosario's urban agriculture programme has allowed many men and women to improve their livelihoods.

Over the years, Rosario's PAU evolved from an approach to put food on the table, to a tool for job creation, and more recently to a strategy for tackling climate change. It is now fully integrated into the urban planning of Rosario, its 10-year Strategic Plans of 2008 and 2018, and the Environmental Plan of 2015. See further details in Appendix 2.

The case of Rosario shows that cities can be more sustainable and more productive for more residents through inclusive and empowering climate actions. These types of innovations are more important than ever as cities start to recover from the COVID-19 pandemic. Success factors are:

(i) a long-term vision and integrating UPA in longer term and strategic planning, and more recently into physical planning for both urban and peri-urban areas;

(ii) financial sustainability of farmers and the PAU;

(iii) political and policy continuity and strong leadership from Local government complemented with financial and capacity support from national actors and local NGOs as well as from international entities; and

(iv) integrated approach and using the multifunctionality of UPA: agro-ecological practices allowed the program to rehabilitate and revitalize urban spaces, while providing employment opportunities for poor and marginalized families.

[5] CDKN Reports. RUAF Foundation. https://cdkn.org/project/monitoring-impacts-of-urban-and-peri-urban-agriculture-and-forestry-on-climate-change-adaptation-and-mitigation

CHAPTER 4. Challenges and Barriers for Maintaining, Consolidating and Scaling Up UPA

4.1 Exclusion of key actors in UPA and food system

COVID-19 has shown the vulnerability of our food system and its inequalities, and the call for food system transformation increased. However, at time of writing, most government responses focus on vaccinations and bouncing back, not moving forward. This transformation needs considering the multi-functionality of food and agriculture systems and the opportunities within cities and city regions, along with a participatory process at various levels to discuss and work on the changes wanted and needed (van Veenhuizen and Wing-Davies 2022, forthcoming).

Urban growth, combined with limited employment opportunities in cities, is leading to a more rapid increase in poverty in urban areas than in rural areas and urban slum populations continue to grow (IPCC 2022). In most of developing Asia, urbanization has been accompanied by slums and shelter deprivation, informality, worsening of the living conditions, and increasing

risks due to climate change and exclusionary urban forms. The cities with the highest numbers of urban poor are in the PRC, Indonesia, and the Philippines, while the highest urban poverty rates are in the Pacific Island countries of Papua New Guinea and Vanuatu, and in Indonesia and the Lao People's Democratic Republic (World Bank 2017). Asia has 60% of the world's total slum population, and many more live in slum-like conditions. Working poverty and informality are high in Asian cities and towns (Acharya et al. 2020; Lindfield and Steinberg 2012).

Many of the urban poor are involved in often informal food chains, as producers, processors or vendors. Some of these food producers are not remunerated or are underpaid. Many also lack equitable access to and ownership of assets, resources, and incomes. Other social and economic inequalities, such as in access to employment opportunities, also increase vulnerability and cause political instability.

Discriminatory social norms, practices and roles shape the gendered distribution of paid and unpaid work, or gendered vulnerability (IPCC 2022). There are significant barriers to participation in food value chains due to socially determined identities, roles, rights and obligations of women and men, and structural inequalities embedded in the system. Most work to address gender inequalities in the food system to date has focused on rural areas, with a particular focus on women producers. But there are vast gendered disparities in urban food systems too, which have been largely neglected by city officials, economic planners and development practitioners. Next to women and girls there are several other groups whose livelihoods are impacted by inequity in food systems. Youth, indigenous peoples, migrants and refugees (van Veenhuizen and Wing Davies, 2022), all face significant socially constructed and often structural barriers. But applying a gender lens to urban food systems does not mean considering only women. The lived experiences of people of different genders are impacted by intersections of race, class, ethnicity, ability, and other factors constituting their identities.

4.2 Land challenges and barriers

Preserving cropland swiftly disappearing

Accessing urban and peri-urban land for food production and other food-related activities, remains probably the most difficult challenge to address. On the one hand, expanding cities is eating up arable land and drinking up scarce water resources that have significantly contributed for centuries to feeding Asian urban populations. On the other hand, the data on land grabbing of arable or pastoral land is alarming (Rulli et al. 2013; Bren d'Amour et al. 2017) and entire rural and peri-urban territories are

converting to industrial farming for food export goods. As a result, rural migration continues, turning rural farmers into food-dependent urbanites without land on which to cultivate crops, raise animals, or transform locally produced food (Cabannes and Marocchino 2018). As cited in RICH Food Smart City (Acharya et al 2020), "between 2000 and 2030, Asia will have lost between 16 and 21 million hectares of cropland due to urban expansion."

Tensions between land use for urban agriculture in informal settlements

Tensions between urban agriculture activities and housing are not limited to the "formal city" but tend to be exacerbated in informal settlements and where land is not legalized or where land regimes are unclear for lack of cadastre, etc. This is particularly the case in settlements along canals and rivers in various Asian cities. Despite these tensions between a place to stay for the very poor and a place to grow food as happens in Payatas, Quezon, Philippines (Bagotlo 2021), solutions are worked out by communities as in Chiang Mai (Boonmahathanakorn 2021) and sometimes taken as part of integrated neighborhood on site improvements (e.g., Community Organizations Development Institute or CODI program].

Difficulties to expand land for food production and the food chain as a whole

Even if preserving disappearing cropland remains a central challenge, what is needed, and therefore even more challenging are ways to find spaces to increase food production and animal raising around cities and to provide spaces for the food chain to act properly: for transportation (primarily two wheelers in cities in front of a constant expansion of private cars, e.g., Delhi adding 500 new cars every day to the 3.3 million existing) (Hindustan Times 2022); and for markets of all kinds including those occurring in streets and public spaces, generating strong tensions for a harmonious cities for all.

Loss of cropland in and around Asian cities as a result of climate change impacts.

These massive losses can be permanent or are less visible, for being seasonal. This is the case, for instance in Bangkok, where cropland is abandoned part of the year, when flooded, forcing urban farmers to look for work in service sector the rest of the year. This latter issue is less known and studied but affects both livelihoods of the poor and food security.

4.3 Planning challenges[6]

Urban planning and food: a missing link

Until the early 2000s, food and urban agriculture and planning have been strangers for diverse reasons (Pothukuchi and Kaufman 2000). As a result, master plans when existing, as well as other planning documents have paid little attention, if any, to the integration of urban agriculture and food-related activities in zoning plans and zoning rules, land use, urban codes and standards. Urban agriculture was confined to a tolerated or illegal sector, despite its importance for the poor and very poor. Such a situation was and still remains a major barrier for the consolidation of urban agriculture and the whole food chain. However, food is less a "stranger to urban planning" today than 20 years ago as innovative local food planning practices are emerging in Asian cities, and some presented here testify to these developments.

A good indicator of this current gap that needs to be filled is that, so far, not a single food planning guide or manual that Asian governments could refer to is available. Food security and urban agriculture should be part of master plans and local development plans as will be argued in next chapter.

A detailed monitoring, review, and analysis of declarations, charters and agreements in relation to the interface between food and urban (Cabannes, 2012)[7] suggests that despite some progress, such as the ones contained in the UN New Urban Agenda or FAO Food Strategy, or the Milan Urban Food Policy Pact, there is still a need for better integration between food and planning and a need to fill the urban – food gap and the urban planning -food and urban agriculture one, in the first place.

Challenge of addressing the diversity of "urban" Asia when considering urban agriculture and food planning.

Stating that our world is becoming predominantly urban, even if this is quite real, begs the question of what is actually meant by 'urban'; definitions of 'cities' and 'urban' vary greatly from one Asian country to another. In addition, where food is concerned, intermediary cities bear little in common with megacities or with agricultural regions with a tight network of small towns around an agricultural hub. Therefore, a one-size-fits-all food planning approach does not work.

[6] This section, as well as section 5.3, draws largely on lessons from Cabannes and Marocchino 2018, book FAO/ and primary from the Asian cities related chapters. It draws as well from Dubbeling et al. (2010), and in particular from chapter three: Process and Tools for Multi-Stakeholder Planning of the Urban Agro-Food System

[7] See also pp 20 - 23 and Appendix 1: declarations, charters and agreements in relation to integrating food into urban planning, in Cabannes and Marocchino 2018.

Food planning in non-legalized settlements where the poor live

A challenge and complex issue for food planners relates to non - legalized settlements where food-related activities and primarily urban agriculture are practiced either as a survival strategy and for self-consumption or as market-driven one, for income generation and livelihoods. A dilemma for planners exacerbated by the lack of formal land regime, is which type of food activity should planning facilitate as each one of them has quite different requirements. And additional tension or conflict that planning is challenged to mitigate in low-income settlements refers to regulation of land use either for housing, a priority for the homeless, or for urban agriculture.

4.4 Lack of innovative, low-cost technologies for urban and peri-urban food production

The specific interactions between urban farming systems and their diverse urban environments create specific opportunities and challenges for technical, social, organizational and institutional innovation. Key areas include high land prices, food safety, opportunities, and risks of applying recycled urban water and nutrients (Prain and de Zeeuw 2007). The innovative nature of UPA concerns a number of different but interrelated dimensions, including confined land space, urban metabolism, the organization of production, and urban design and planning.

The range of UPA practices, as illustrated earlier, encompasses specialized micro-units of intensive livestock raising and horticultural production; vertical farming in Japan, the PRC or Singapore; simple Aquaponic systems (sometimes without the need of cultivated land); or inner city initiatives where the food grown is naturally adapted to the microclimates in and around buildings, to peri-urban greenhouses (like around Beijing, Zhang et al. 2007) or precision farming. This variety of UPA implicates a wide range of possible manifestations, and hence innovations–each having their own unique fit with the physical and socioeconomic environment. Hence, not only the high-tech (controlled environment) initiatives are sufficiently adapted to the city, and can solve the issue of urban food provisioning, but low-tech solutions (such as simple no space-low space techniques as in Gampaha, Sri Lanka (Ranasinghe 2009) may be equally important. The character of innovation may be quite different in each case.

Increased recognition of the role that food can/does play in responding to various urban sustainability concerns provides new market and engagement opportunities for the private sector. Business opportunities exist in traditional food services (production, processing, retail), and increasingly

in resource recycling, development of new products and services, and technological innovations. Private sector players can fulfil an important role in speeding up and implementing scalable urban food system innovations. Because of their large consumer markets, more direct consumer relations, and close collaboration between various players in the food supply chain, city regions offer traditional and new private sector players some unique opportunities. A main issue that hinders the growth of these businesses is the absence or scarcity of adequate laws and regulations framing the sector. Whereas policies exist for the promotion of green spaces in the city for ecological-environmental, aesthetic-recreational, and social-educational purposes (Lindfield and Steinberg 2012), the same cannot be said for UPA which is oriented towards food production. Challenges for smaller and medium-scale private enterprises generally lie in volume (bulk) requirements and price settings, product quality, and standards. From a food safety perspective, the potential risks associated with environmental pollution should be addressed when agricultural products are cultivated within the urban environment.

4.5 Challenges of informal food markets, including gender inequity, weak food safety provisions and lack of nutrition awareness

Although informal food market chains from producers to retailers are among the largest sources of urban employment in Asia and provide probably the biggest opportunity for women to earn income(FAO 2007; ILO 2020), the conditions under which many producers and vendors operate are often precarious, with an unstable income flow, long working hours, uncomfortable working conditions, and exposure to harassment by local officials.
The precarity of this form of employment falls heavily and unequally on women and youth as both FAO and ILO evidence makes clear. The situation is especially difficult in cities such as Dhaka, where gender inequalities are exacerbated by social norms which limit women's physical mobility in many types of households. This means that women's access to markets either as customers or even more so as vendors is constrained. Poor quality and gender-blind infrastructure worsens that situation, with an absence of safe spaces or sanitary facilities for women consumers and vendors in most food markets. Although women's work as vendors is increasing in Dhaka—from 4.1 to 6.2% of all women's employment between 2005 and 2010—only about a third of women participated in the labor force in 2010, compared to more than 80% of men (Mahmud and Bidisha 2018). Nevertheless, market work was the third most important employment for women after agriculture (66%) and manufacturing (11%, mostly in the garment industry).

The precarity of informal food market employment was illustrated during the COVID-19 pandemic. Evidence gathered about responses in some countries indicates that decisions by national or local authorities to close informal food outlets was rushed, without weighing it against other important considerations such as the absence of evidence that informality equals high risk of propagation of the virus, or the fact that these small-scale, informal or semi-formal businesses are the source of revenues and incomes for a very large number of poor but economically active people, especially women and unskilled youth (Bene et al. 2021). There is a particularly painful irony associated with the shutdowns. Many of the closed informal micro-enterprises were already completely "invisible" to the national statistical systems and their "disappearance" due to the COVID-19 has therefore remained unnoticed in government accounting. Yet their closing down has dramatically shown that they are often the only sources of affordable and accessible fresh or prepared food for the poor.

In addition to the challenge of employment conditions, food quality and food safety are also major concerns of in food marketing. Food quality involves the nutritional and health value of foods and consumption of widely available packaged and processed foods with high sugar, fat and/or salt is growing up to five times faster in low-income compared to high-income countries. Some of the highest growth is in Asian countries like Viet Nam (Tefft et al. 2018). The resulting epidemic of obesity across the region has serious consequences for public health (Hawkes et al. 2017).

A recent literature review of food safety and foodborne disease in low and middle income countries (LMICs) came to three conclusions: (i) consumers are concerned about foodborne disease; (ii) foodborne diseases are linked to animal source foods, fruits and vegetables and come mainly from foodborne parasites and microbial pathogens; and (iii) most foodborne diseases are the result of consumption of fresh, perishable foods sold in informal markets (Grace 2015). In part, the presence of these diseases derives from high-risk production practices, but they are also linked to characteristics of markets: the lack of adequate infrastructure such as cold storage, clean water, waste management and sanitary facilities for men and women; the absence of, or failure to apply, food handling regulations along the value chain; and limited capacity among marketing officials, vendors and consumers about personal and food-related hygiene practices.

4.6 Environmental and occupational health concerns limit the contribution of UPA to the transformation of cities to circular bioeconomies

Food safety concerns, together with environmental health issues, also threaten the opportunity that UPA offers to help cities move to circular bioeconomy. Among production practices, the approximately 35 million hectares of urban and peri-urban cropland in Asia irrigated with wastewater is both a necessity for a water-challenged urban future in LMICs and also a potential threat to the health of urban populations. It is estimated that ten times more area of cropland is irrigated with diluted or raw wastewater in the LMICs than the treated wastewater used for irrigation in high-income countries (Drechsel et al. 2015). The widespread use of untreated wastewater for irrigation reflects the informal demand for this abundant nutrient resource, but it is also a source of a wide range of pathogenic viruses, bacteria, protozoa and helminths that can pose both occupational health risks to farmers and vendors, and foodborne health risks to consumers (Bos et al. 2010).

Livestock raising also poses occupational, public, and environmental health risks. The close proximity of humans and animals in many urban and peri-urban livestock raising enterprises increases exposure of livestock keepers, their families and other workers in the value chain to allergies and diseases, including zoonotic diseases, caused by bacteria, fungi, microbial toxins and animal and plant particles. With high density of population these diseases can become public health risks for the local population through direct transmission, through disease vectors such as mosquitos and rodents and via contaminated water, included the transmission of zoonotic parasitism. Animals can also contribute to foodborne diseases through use of unpasteurized milk, for example. Public and environmental health risks can also result from the unmanaged dumping of excreta in water bodies, with potential spill over risks in the food system (Grace et al. 2015).

Recovery and reuse of MSWs pose different types of challenges. The use of domestic and restaurant food wastes as animal feed mainly poses risks to the animals themselves from choking on inorganic solids mixed with the organic waste. Incorrect cooking of this food waste in feed preparation can also result in harm to the animals and potential transmission of diseases to humans.

4.7 Competition for water and the health risks from unregulated use of wastewater

One of the major consequences of urbanization is the increased domestic, commercial, and industrial demand for water resources, which is projected to increase 80% by 2050, at the same time as climate change is affecting the spatial and temporal delivery of water to urban areas (Flörke et al. 2018). Cities in low rainfall areas of Asia such as Pakistan and parts of India will be increasingly vulnerable, and South Asia is expected to be a major 'hotspot' region where competition will be most intense between the urban residential and commercial demands for water and agricultural demand.

Other areas of Asia and the Pacific also face severe competition for water because of weak infrastructure and resource management issues, as well as perturbations in climate. Such a case is the tropical metropolitan region of Metro Manila, which despite having an average annual rainfall more than 3 times greater than Lahore, is located in a country ranked 33rd out of 48 countries by ADB in terms of water security, with the poor severely affected (Lee et al. 2020). Although official statistics show that agriculture in the Metro Manila region contributes a small part of total agriculture value, large numbers of small plots in urban areas have importance for poor people's livelihoods, but these areas are systematically absent in those statistics (Thebo et al. 2014). Water crises such as that reported for Metro Manila disproportionately affect these poor urban producers.

One reason for the weakness of UPA vis a vis other urban sectors in the competition for water is related to the low profile and very limited protection of UPA itself in much urban planning, which was discussed above in Section 4.3. The proliferation of informal 'water grabbing' by urban developers and other actors reflects the limited protection of UPA and its resource needs (Cabannes and Marocchino 2018). This situation is graphically illustrated from Chennai, South India, which, in 2014, experienced a shortfall in formal surface water supply of 200 million litres per day (Nambi et al. 2014). In a pattern repeated in many cities, this resulted in "grabbing" of ground water resources by private, often informal, water traders involved in selling water to slum areas and other users. These traders mostly obtained their water from former peri-urban farmers who sold them water from their boreholes formally destined for agricultural use. Not only were these former farmers harvesting water rather than food, but the resulting reduced level of groundwater made it more expensive for other farmers to access water for agriculture. The overall result was a significant reduction in peri-urban food production around Chennai (Nambi et al. 2014; Padgham et al. 2015).

Given this scenario, the use of wastewater for UPA is critically important both for protecting and expanding local food production and also for recovering a valuable urban resource. Yet this can only become a sustainable practice contributing to urban resilience if the occupational and food safety health risks associated with its use are adequately managed. Unfortunately, despite the huge area of urban cropland in Asia irrigated with wastewater (Thebo et al. 2017) there is limited evidence of regulations being in place (Acharya et al. 2020) or where they exist, being appropriate or effective (Cassou et al. 2017). Some exceptions exist, for example in Beijing, and these will be discussed in Chapter 5.

4.8 Climate change challenges for UPA

Urbanization and climate change are closely linked. More than 50% of the world's population lives in urban areas and urban areas consume as much as 80% of the energy produced worldwide and account for over 70% of energy-related global greenhouse gases (IPCC 2022). Climate change is a key challenge for Asian cities. Already half of Asia-Pacific's urban population lives in secondary cities of less than one million and as urbanization continues, more people will be exposed to direct and indirect hazards of climate change (Acharya et al. 2020). The impacts will continue to devastate lives and homes, and have the potential to undo many development gains of the last few decades. Understanding these impacts begins to equip communities, governments and stakeholders to prevent long-term development losses. The largest increase in CO_2 from energy use will be from developing countries, especially from the fast-growing cities in Asia and Africa (IEA 2021; World Bank 2010; UN Habitat 2019).

Roof Garden on top of a district Administration office building in Laksi, Bangkok, Thailand, an educational, experimentation and demonstration urban agriculture center as part of Bangkok City Food Program (Photo by Y. Cabannes).

Climate change impacts cities in different ways. Areas where climate change will lead to higher rainfall or a rise in sea level face an increased risk of floods and landslides, leading to infrastructure damage, economic losses, and to more poverty and epidemics, which are true particularly for many coastal cities at risk of flooding and extreme precipitation (IPCC 2022). On the other hand, climate change affects food production in and around cities (Padgham et al. 2015; Dixit et al. 2014).

A significant factor linking food security and climate change is the urban heat island effect, which may cause cities to have temperatures that are several degrees higher than the surrounding countryside. Climate change may also lower agricultural production in the hinterland due to changes in average temperature or precipitation. Moreover, transport of food to urban areas may be disrupted more frequently by storms or floods, leading to higher food prices and food shortages in the urban areas. Climate change in certain regions could also contribute to reduction of stream flows leading to problems for the hydropower production and more difficult and costly management of sanitation, waste disposal, water supply and public health in urban areas.

The impacts of climate hazards disproportionately affect people who live in slum and informal settlements on steep hillsides, in poorly drained areas, or in low-lying coastal zones. Climate change adds to the existing problems in these slum areas, either directly (through the effects of more frequent and heavier floods and landslides) or indirectly (through higher food and water prices, inflow of migrants, more diseases). Moreover, the urban poor have a low capacity to cope with the effects of climate change. For example, the urban poor often spend 60 per cent or more (up to 100 per cent for the poorest) of their cash income on food.

4.9 Financing of urban and peri-urban agriculture: a major bottleneck

Existing literature on financing urban agriculture is scarce, and refers essentially to credit systems for market-orientated urban agriculture in North America and, to a lesser extent, Europe. Therefore, sections relating to financing urban agriculture in this report draw primarily from three research programs on financing urban agriculture, spanning from 1988 to 2015,[8] that involved over 35 cities, primarily from the global south and including Asian cities[9]. It was complemented with lessons learned from exposure to Asian cities' practices and additional interviews for the present work with partners, primarily from Thailand and Bangladesh (2022).

[8][a] Survey on credit and investments for urban agriculture was conducted with 13 cities, commissioned in 2002 and 2003 by UN-HABITAT, UMP-LAC, IPES, IDRC and RUAF Foundation (Cabannes 2006 and local studies).
[b] research programme on financing of small-scale urban and peri-urban agriculture (UPA), coordinated by RUAF Foundation (2008– 2011) carried out with 17 cities from the "Global South" (Cabannes 2012; Cabannes 2013 and local research reports).
[c] Comparison of four financing practices in cities in the Global South, RUAF: 2015
[9] Primarily the research developed on the following cities by local research teams. These reports are available on RUAF website:
-Jayasinghe-Mugalide, Udith (2009) on Gampaha, Sri Lanka;
-Jianming, Cai and Guo Hua (2010) on Tongzhou and Huairou district, Beijing;
-Ramalingegowda et al (2010) on Magadi-Bengaluru (Bangalore), India and
-Yin Zheng et al, Minhang district, Shanghai.

Findings from these different grounded research programs (Cabannes 2015) strongly suggest that, despite some progress in a limited number of cities, financing of UPA is a major bottleneck in maintaining, expanding and scaling up the production of affordable, nutritious and accessible food in cities.

Conceptual bottleneck: insufficient understanding of what financing urban agriculture means

The concept of "financing" is not limited to micro-credit or credits delivered by banks and microfinance institutions (MFIs). Urban Agriculture in Asian cities, and more broadly in the global south is financed through a complex and changing combination of:

Monetary and non-monetary resource mobilization by urban farmers + individual and collective savings + Subsidies, generally public, under quite different forms + Micro credits and conventional loans, again of different kinds and origins.

Such an equation needs to be taken into account for strengthening the financing of urban agriculture. Approaches focusing only on credit usually show their limits and do not sustain through time. They might be useful though for a thin slice of the variety of producers and food traders.

A huge gap between a limited demand from urban farmers and a restricted offer from banking institutions

Lessons from the field clearly indicate that insufficient financial offer is only one part of the problem. A more fundamental barrier is, on the one hand, the reluctance of most credit institutions, including MFIs, to provide loans to urban agriculture, and on the other hand, a reluctance to ask for loans or even subsidies from urban farmers and producers along the food chain.

From the public and private institutions side, the most frequently mentioned [good and bad] reasons are relatively few but constant, and lead to a lack of recognition of urban agriculture as a bankable sector: (i) a supposedly high rate of default; (ii) too high risk because of possible crop failure, essentially for climatic reasons as, for instance, in Gampaha, Sri Lanka (Jayasinghe and Mugalide 2009), or animal disease; (iii) limited financial management capacities of farmers; and (iv) lack of proper title deeds or collaterals from urban farmers.

Urban farmers usually express a high level of needs but at the same time are reluctant to ask for loans or even subsidies, for a large number of reasons: (i) the loans offered are generally not adapted to agricultural and animal-raising cycles (e.g., Beijing, PRC); (ii) "too much bureaucracy" and procedures are not sufficiently clear; (iii) impossibility to get loans or public subsidies for not having formal land titles (e.g., Magadi, India); (iv) much too

high interest rates, primarily those practiced by MFIs; (v) a counterintuitive finding is that "loans are not small enough" and the minimum amount offered remains beyond the repayment capacities; and (vi) low capacity to prepare funding applications, either to obtain subsidies or to get a loan.

4.10 Lack of integration of the food system into urban governance

Until quite recently, food has been a marginal or non-existent topic in most city administrations in Asia (Cabannes and Marocchino 2018). Food in Asian cities has been "everybody's business and nobody's business" (Acharya et al. 2020). The entrenched dichotomy of "rural–urban" has been identified as a key explanation for this strategic and policy gap, especially the idea that food and agriculture are part of the rural domain and the responsibility of ministries of agriculture. The ideological dichotomy of rural-urban was also a legacy of colonial regimes in the global south, involving the inherited idea about 'chasing farming out of cities' (Prain 2010). The predominant responsibility for agriculture and food assumed by national ministries of agriculture distances food production, distribution and consumption from urban governance, because of the often-difficult vertical governance relations between national and local governments (Tefft et al. 2020). Even if national ministries of agriculture often have offices at municipal level, they are often disconnected from other parts of local government with food-linked responsibilities. The vertical fragmentation and exclusion go further, and extend to the absence of a voice in food issues, food policies and food governance by local food producers, different kinds of market vendors, and consumers.

A second challenge concerns the frequent lack of jurisdictional clarity over food production areas and market chains within a city region (Blay-Palmer et al. 2018; Acharya et al. 2020). This makes it very difficult to coordinate management of water and land resources, better integration of market chains or even the provision of agricultural extension advice. Food systems do not respect administrative boundaries and administrative divisions can disrupt food systems. Further disruption can occur in those countries without devolved agricultural development policies when ministries of agriculture, for reasons already mentioned, become actively involved in the 'rural' production areas of peri-urban administrations, for example in the administration of irrigation systems, which straddle urban and rural spaces, further complicating coordination.

A third challenge for integrating the food system into urban governance is the fragmentation of responsibilities for food-related issues among urban agencies. Local health departments have some responsibility for human

nutrition and foodborne diseases, but they are more likely to interact with national health ministries than they are with local government agencies responsible for food markets or agricultural production where the threat of foodborne diseases is located and where solutions for local malnutrition exist. Environmental health officers responsible for areas of animal production and for slaughterhouses may also be disconnected from human health specialists with concerns about zoonotic diseases and an interest in child intake of animal source foods for improved nutrition. This fragmentation of responsibilities and the limited connections and influence with those within urban administrations who formulate local government policies seem to particularly affect small and medium-sized cities in Asia, which have made limited progress with integrating food systems into governance (Acharya et al. 2020).

A further challenge to establishing integrated, inclusive and forward-looking urban food governance that helps nourish the city, is the food industry. The experience of Bangkok probably resonates across many cities in Asia and the Pacific in the way that food companies dominate many parts of the food chain, from contract farming to wholesaling and supermarket retailing to the marketing of processed foods and the manipulation of consumer tastes (Boossabong 2019).

CHAPTER 5. Strategies for Addressing the Challenges and Barriers

5.1 Strengthening a systemic approach to urban food systems

UPA takes place within the boundaries of a (city region) food system, and it is essential to ensure its linkages with the complex network of food system actors, processes and relationships (in food production, processing, marketing and consumption) that are directly and indirectly connected with UPA. Ensuring the availability, accessibility and affordability of sufficient, quality, appropriate, safe and healthy food requires better understanding and planning of the food system. Key conceptualizations to help with this understanding are a systems approach, acknowledging the multi-functionality of food and UPA that involves multiple sectors and multiple scales, and taking a flexible, participatory and inclusive approach.

Food systems approaches analyse the relationships between the different parts of the food system and the outcomes of activities within the system in socioeconomic and environmental/climate terms. Feedback loops are a

distinguishing factor in systems thinking; they occur between parts of the food chain (production, processing, distribution and consumption) and from the socioeconomic and environmental outcomes. They also shed light on non-linear processes, and on possible trade-offs between policy objectives. Systems thinking provides issues to address and discuss; maps the impact of environmental and climate changes on food security (vulnerabilities of the food system); and can contribute to the search for possibilities for strengthening the system's resilience. The High-Level Panel of Experts (HLPE 2020) in their 15th report[10] presents the evolution of the Sustainable Food Systems Framework, which now firmly includes attention also to Food Environment, Sustainability and Agency.

Urban food systems combine different means of food provisioning and consumption. Some cities mainly rely on urban, peri-urban and nearby rural farms and food processors, while others depend mostly on food produced and processed in other countries or continents. City region food systems encompass the "complex network of actors, processes and relationships to do with food production, processing, marketing, and consumption that exist in a given geographical region that includes a more or less concentrated urban centre and its surrounding peri-urban and rural hinterland; a regional landscape across which flows of people, goods and ecosystem services are managed (RUAF 2015).[11] In this concept of city region food systems, not only major cities and urban agglomerations are included, but also the small and medium-sized towns that provide critical links between people in rural areas and urban services, markets and employment opportunities. Working at city region level can leverage the complexity of rural-urban linkages to a practical level by making food the common denominator. This implies that broader issues (i.e., human rights, climate change and resilience) can be addressed in a more focused manner. Food systems approaches encompass the flows, relations and tensions as well between different scales: neighborhood, districts, municipality, metropolis and region, along the urban- rural continuum.

City governments—in partnership with other stakeholders—are appropriate actors for instigating actions to shape the food environment with the aim of improving urban nutrition. The food environment is the combination of availability/accessibility, affordability, convenience, and desirability of different foods (Halliday et al. 2019).[12] These dimensions determine respectively people's physical access to food, their purchasing power, their knowledge about food, and their preferences, which in turn determine the nutritional quality of the diet they consume.

[10] https://www.fao.org/3/ca9731en/ca9731en.pdf
[11] Also see https://www.fao.org/in-action/food-for-cities-programme/overview/crfs/en/
[12] https://ruaf.org/document/a-menu-of-actions-to-shape-urban-food-environments-for-improved-nutrition/

5.2 Strategies to increase social inclusion and build individual, household and organizational agency

In 2021, more than two thousand game-changing propositions have been gathered under five action tracks as part of the process of the United Nations Food Systems Summit.[13] Action track 4 emphasized advancing equitable livelihoods and building the agency of the underrepresented, i.e., "those that lack the space or the enabling environment in which to exercise their power and rights." For this, a thorough understanding of the food system, its vulnerability, potential entry points, etc. is required along with a series of participatory discussions at various levels on the changes wanted and needed, and building capacity of women, youth, small-scale producers and displaced communities (van Veenhuizen and Wing Davies 2022).

Increasingly, there is a call for inclusive (localized) food systems, and a human rights-based and agroecological transformation of food systems, which involve informal sector actors such as smallholders, vendors, slum dwellers and displaced persons (HLPE 2019). With the incidence of climate-change-driven migration set to rise, the intersection of social inclusion and urban food policy will remain critical for years to come. Putting ordinary citizens at the centre of the food system requires flexible local structures such as food change labs and local food councils to not only improve inclusion but also to stimulate further uptake and policy change on the ground that will allow these citizens to easily participate. Interventions to improve the sustainability and nutrition of food can be misdirected when based on incorrect assumptions about people's priorities and knowledge. The needs and interests of those who form the backbone of food supply chains, from small-scale producers, processors, distributors and vendors to citizen-consumers, are too often overlooked. Multi-stakeholder platforms should ensure that they are represented given their critical role in feeding the majority of urban citizens. When citizens have the capacity to act on their own priorities, in other words when they have agency, there is the potential to achieve better and more durable outcomes. Interventions need to be carefully grounded in the realities of the food systems of the majority.

Shocks and stresses can exacerbate pre-existing vulnerabilities in city region food systems and disproportionately affect those with the weakest capacity to adapt, including women (Halliday et al. 2020). Joshi, Gallant, and Hakhu (2020) further recommend a series of guiding principles to mainstream gender in UPA, including that transforming gender-power relations require

[13] See https://www.un.org/en/food-systems-summit/action-tracks

connected interventions over long periods of time and that interventions should have this intent built into the design. Forced displaced people without formal refugee status must also be granted safe access to the labor market, including the food supply chain, as a mechanism to support sustainable livelihoods. Food system transformation requires prioritizing access to food as a fundamental human right, one that is inseparable from social justice: "feeding people is one of the primary objectives of any government and is a part of national sovereignty."

5.3 Strategies for accessing urban and peri-urban land

Financing access to intra and peri-urban land remains probably one of the most challenging issues in relation to increasing UPA production and strengthening localized pro-poor urban food systems. As mentioned in Chapter 4, small-scale urban farmers have limited capacities to resist evictions and displacements resulting from urban expansion, speculative land markets, land grabbing or the effects of climate change.

Preserving strategic cropland is a matter of overall master planning

One of the major strategies is preserving strategic cropland at all cost, not only for its productive value but also because of its multiple benefits. As highlighted by Acharya et al (2020), "Integrating agricultural considerations into spatial planning is probably necessary, though not sufficient, to ensure that strategic cropland is identified and saved from seeing its economic viability condemned." It tends to demonstrate how land and planning are closely connected to turn this strategy possible.

Access to secure land through collective, cooperative and communal forms of tenure

In this context, practices that facilitate or strengthen collective, communal or cooperative forms of farming and land tenure are crucial for years to come. Various evidence from literature review (Cabannes 2013 and 2014) and practices (Davis et al. 2020) related to non-individual forms of tenure tend

to indicate, as in the case of Community Land Trusts (Diacon et al. 2005),[14] that they increase security of tenure on land for the poor and for small-scale producers (Cabannes 2015). In addition, the New Urban Agenda, approved in 2016 during Habitat II City Summit in Quito, highlights their importance along with cooperative forms to increase security of land tenure and access to land. Various countries (for instance Indonesia, Bangladesh, the PRC, or Magarpatta in India) are either exploring or implementing variations of such solutions.

Short and temporary lease and land banks for poor urban farmers

Increased security of land tenure for urban and peri-urban farmers, informal market traders, small-scale agro-industries and street food hubs is powerfully practiced through short and temporary leases, and not only through individual or collective ownership, which are more complex and costly to achieve. Both cases highlighted as good practices in Bangkok and Rosario are interesting illustrative examples:

(i) **Bangkok: City Food Program.** One significant CFP achievement in the cities where the program is active was its engagement with local governments to expand the standard duration of temporary lease from one to three years that allows farmers and traders to reclaim soil, increase their productivity, and invest in their activity. This was made possible because CFP constantly looks for partnership with central government and municipalities. The example highlights how governance, land and fiscal policies are closely interlinked to turn idle or speculative land into productive places.[15] Similar to Rosario, the waiving of land taxes for the actual landowner in exchange of allowing the land to be cultivated under temporary lease served as an incentive, with a cost absorbed by the local government.

(ii) **Rosario Urban Agriculture Program**. Through ordinance 1.4713/89 Rosario Local Government established that public and private lands could be used for urban agriculture (Cabannes 2012, pp. 54-55). This ordinance encouraged landowners to allow the use of their lands for a minimum of two years for productive purposes in exchange for tax reductions. Later in 2004, Rosario formulated and

[14] What is a community Land Trust? A community land trust (CLT) is a not-for profit community-controlled organization that owns, develops and manages local assets for the benefit of the local community. Its objective is to acquire land and property and hold it in trust for the benefit of a defined locality or community in perpetuity. A CLT separates the value of the land from the buildings that stand on it and can be used in a wide range of circumstances to preserve the value of any public and private investment, as well as planning gain and land appreciation for community benefit. Crucially, local residents and businesses are actively involved in planning and delivering affordable local housing, workspace or community facilities. CLTs use a variety of legal structures and conduct a wide range of activities to meet local needs. Typically, there is a strong emphasis on local community empowerment and the democratic stewardship of the assets. (Diacon and al:2005)

[15] Piyapong Boossabong, Cheng Mai University and CFP, data collected for the present study, Feb. 2022

voted the establishment of a municipal land bank for poor and urban farmers, including both public and private lands.[16]

Transitioning to organic food production

Another crucial aspect of urban land strategies while considering urban agriculture is not only to preserve and possibly expand strategic cropland. In effect, current soils might be metal contaminated, irrigation water not proper and what is cultivated can be either suffering from expansion of agro-export monoculture and use of agro-chemicals harmful for health. What is at stake in the long run is to turn cities and their hinterland hubs of healthy, highly valued and nutritious food. This means transitioning from conventional chemical-based extensive production to intensive organic methods. Expanding and acquiring land can mean, if not well controlled and addressed, an expansion of non-healthy food. As the cases of Bangkok or Rosario illustrate—and there are some Asian cities' experiences available—the transitioning towards urban agro-ecology means a cost over one or two decades, which require investments that an international development bank such as ADB could consider. Before engaging into such investments, multi-dimensional (financial, economic, environmental, social) cost–benefit analysis of urban agriculture should be conducted locally in order to demonstrate the extent of their multiple benefits.

5.4 Integrating food and agricultural land use into urban planning

A solid set of urban agriculture and food planning tools has been designed, experimented with and adapted to local realities (De Zeeuw and Drechsel 2015, Chapter 3; Cabannes and Marocchino 2018, Chapter 1) but with Asian cities (including most of their "smart" ones such as those in the PRC, India or Korea) lagging behind. This toolbox provides confidence to address pro-poor food planning challenges in cities and to shift from limited scale to multi-scalar urban agriculture and food systems planning. Some of them are briefly introduced below.

Multiplicity of urban agriculture and food mapping tools and methods to start a planning process. They fall under different categories:

(i) **Food assets mapping** as for instance: (i) Multiple scales food asset mapping, e.g., Toronto (Toronto Food Policy Council 2016;

[16] In case of private lands "The Urban Agriculture Program will administer a bank of private lands, held by individuals, businesses, institutions, foundations, etc, which voluntarily donate these lands. A land registry of these properties will be opened." (Article 4).

Baker 2018); (ii) Land mapping of potentially cultivable areas as in Rosario, Argentina and other Latin American cities; (iii) Mapping and audit of productive urban land e.g., Bristol (Carey 2011).

(ii) **Mapping of critical issues on urban agriculture and food,** as for instance: (i) Food environment mapping (Baltimore) addressing inequality in access to nutritious food and identifying food deserts or (ii) Hunger mapping (Fortaleza, Brazil) to locate where hunger was more intense and frequent.

(iii) **A third mapping category focuses on food itself linking it with different aspects of the urban food system**, as for instance (i) fresh food markets mapping (Dhaka) or (ii) CFP Food Journey mapping (Chiang Mai, Thailand; see Section 3.1). It consists of identifying the distance covered by key commodities consumed in the city and assessing their carbon footprint and energy consumption.

Urban Agriculture and Food-Related Land Zoning, Land Uses, and Regulations

Land zoning, changes of land use, and legalizing urban agriculture and food activities are among the most adapted tools to strengthen resilient food systems (Acharya et al 2020). This is the case of Letchworth, United Kingdom, the first Garden City (1904) where half of the land is still cultivated in 2022, or Milan, probably one of the most innovative cases in terms of planning with its South Milan Agro Park at regional level[17] (Quaglia and Geissler 2018) complemented at municipal level by Milan Agri-district (Consorzio DAM 2011). The planning experience of Rosario Municipality (see Section 3.2) illustrates an innovative integrated **mixed land use zoning**. The more than 800 hectares Agrarian Park approved in 2011 and complemented with a planning ordinance (2020) combines industrial and logistical, organic and non-organic food production, mixed agricultural and agro-industries, industries, and waste management areas.

Triggering Role of Urban and Peri-Urban Agriculture for Local Food System Planning

Food systems planning processes can have quite different entry points, such as hunger mitigation, nutritious food, health, emergency and crisis or economic development according to specific locales. They can start as well from different steps within the food chain, notably markets and from quite different territories (neighborhood, districts, city or even metropolitan region). However, a review of the literature highlights the catalytic role played by urban agriculture in sparking a food planning process, as for instance Bangkok and

[17] PASM allowed the maintenance of 66 000 hectares under cultivation and 1400 farms stretching over 61 municipalities) and Municipal Milan Agri-district [31 farms / 1500 hectares]

Rosario described in this paper. This role constitutes a compelling argument to partially answering: why urban agriculture?

Multi-stakeholder Policy formulation and Action Planning (MPAP) on urban agriculture

The MPAP[18] constitutes so far the most robust method for food planners, and has been tested successfully in a large number of cities around the world, including in the PRC, India, and Sri Lanka (City of Gampaha 2007; Dubbeling 2010). The Rapid Urban Food System Appraisal (RUFSAT) is another method introduced by FAO (2017), notably in Dhaka, Lima, and Nairobi, to assess a city-driven food system and propose recommendations for policy and planning design and further interventions.[19]

Linking up food and urban agriculture plans at local level with other planning instruments. As underlined by Acharya et al. (2020, p. xxx), "National government entities have important roles to play in support of proactive and well-designed food system interventions at the city level. Many city-level actions in the food space will need to be enabled and guided by national laws, regulations, standards, and plans." (See recent development in Bangladesh Government studying the creation of a Food System Planning Unit, under the Ministry of Local Government). In addition, connecting strategic and medium-term plans with city master plans and food strategies is equally powerful as practiced in Beijing (Cai et al. 2022).

Need to implement a research agenda related to urban agriculture and food systems planning.

Even if significant progress has been made worldwide in relation to food and urban agriculture planning, various issues need further research and development[20] such as: (i) mechanisms to better include the informal food sector in food system planning; (ii) better integration of "last food mile" solutions into spatial planning; (iii) planning regulations for informal UPA and street markets; and (iv) "water planning" as master plans have so far essentially considered land use and not enough water property and use regimes and their spatial planning implications.

[18] The main output of a MPAP "is the joint development of a city strategic agenda on UPA. The agenda will have to be operationalized into a series of operational plans regarding the design and planning of the various projects prioritised in the Strategic Agenda as well as the revision or development of new norms, by-laws and regulations on (peri) urban agriculture."

[19] The tool includes 4 components: Consumer analysis; Sustainable Food Value Chain Analysis; Policy audit and Urban Food Systems stakeholders' analysis; GIS Urban food systems Mapping. RUFSAT establishes close linkages with multi-stakeholder platform, both for information gathering and policy recommendations.

[20] For a more comprehensive research agenda see Y. Cabannes and C. Marocchino, eds. 2018. Integrating Food into Urban Planning, pp 50-57.

5.5 Strategies for regenerative agriculture, agroecology and business development services

UPA over the past decades has become a fertile ground for innovations, typically about intensifying production, processing, distribution and/or recycling technology, like low space no space in Gampaha, Sri Lanka or gardening in sacks (used in urban slum areas and in refugee camps), hydroponics, or modular design or vertical farming, or roof top gardening in Nepal and many other parts of Asia. On the other hand, UPA should be included in the urban fabric, in such a way that it simultaneously contributes to other functions. Innovations also are about intensifying the restoration of natural ecosystem functions and their exploitation as productive urban landscape, and about exploiting possible synergies and trade-offs, between different activities and functions, (such as adaptation to climate change, using flood plains, enhancing biodiversity, or recreation [for example in Beijing: Jian et al. 2005]), and edible green infrastructure.

Regenerative approaches to food production will ensure the food that enters cities is cultivated in a way that enhances rather than degrades the environment, as well as creates many other systemic benefits. Regenerative food production encompasses any production techniques that improve the overall health of the local ecosystem. Examples include shifting from synthetic to organic fertilizers, employing crop rotation, agroforestry, conservation

Box 1 Agroecology

Agroecology is a dynamic concept that has gained prominence in scientific, agricultural and political discourse in recent years. It is increasingly considered a promising approach to contribute to transforming food systems by applying ecological principles to agriculture and ensuring a regenerative use of natural resources and ecosystem services while also addressing the need for socially equitable food systems (HLPE 2019). These frameworks[21] emphasize the transition to resilient food systems, and the importance of integration, diversification, building agency and stakeholder engagement. Agroecology and other regenerative approaches remain contested, and are viewed as 'alternative' and sometimes receive direct opposition from dominant agricultural policies that lack understanding of added value or true cost calculations. The Global Alliance of the Future of Food (GAFF) critically assessed the viability, profitability, scalability, and the evidence available for agroecological approaches.[22]

[21] Also see https://www.fao.org/agroecology/home/en/ or other interpretations of Agroecology principles
[22] See: https://futureoffood.org/insights/the-politics-of-knowledge-compendium/

agriculture, crop variation to promote biodiversity, and permaculture.[23] While local sourcing is not a silver bullet, reconnecting cities with their local food production supports the development of a distributed and regenerative agricultural system.

UPA is innovative in the way it organizes the production, processing and distribution chain (both, social and market innovation). It is generally characterised by short supply or value chains. UPA creates employment, is able to manage waste and wastewater (see other sections), and is a way to reconnect farmers with urban dwellers (Wertheim-Heck 2016).

Furthermore, communication, awareness, capacity building and education of actors in the food chains (like urban farmer organization, regional markets, etc.) and provision of business support services (granting access to land, markets, infrastructure; offering training and advice) are complementary strategies delivered by many governments and larger (inter)national private sector (RUAF 2006).

5.6 Strategies for repositioning local food marketing

Despite the growth of supermarkets in Asia, most poor residents of LMICs in the region still obtain a major part of their fresh food and an important component of prepared food from local wet markets and the network of vendors linked to these markets, and for good reasons (Wertheim-Heck et al. 2019; Song and Taylor 2018):

(i) They often offer lower prices, facilitate purchase of smaller quantities and vendors offer sales close to households.

(ii) They are a major contribution to employment and income for low-income citizens, especially women and many vendors are also local food producers.[24]

(iii) These markets and vendor networks are considered a critical component of inclusive urban food security (Hawkes et al. 2017).

At the same time, it is widely recognized that there are trade-offs between food access and food safety (Grace 2015) and also that the working

[23] See for instance https://ellenmacarthurfoundation.org/articles/regenerative-agriculture

[24] The frequent closing down of these markets during COVID lockdowns and the chaos that ensued for both consumers and vendors graphically demonstrated the dependence on these markets for food and employment by millions of poor people (Bene et al. 2021).

conditions for vendors, are often precarious. For food markets to work better and safer for producers, vendors, and consumers, repositioning is needed in market infrastructure, functioning, and in the capacities of market actors. Policymakers need to recognize that this informal system can be part of the solution to urban food resilience for the poor, not part of the problem.

Market diversification

Increased benefits can be obtained for producers, vendors and consumers if markets are diversified. This builds on the economic and environmental opportunities offered by short food supply chains, linking urban and peri-urban food production with urban consumers. One option is the establishment of green markets. In some locations, investment can support social enterprises that promote these markets, as in Bangkok (Boossabong 2018). In other cases, investments can support public–private or public-civil society partnerships to run local markets, as in Lima, Peru (Arce et al. 2007; Santandreu 2018). In both Bangkok and Lima, green markets provided a venue for urban and peri-urban farmers to sell ecological or organically certified vegetables and animal source foods directly to consumers and for other vendors to also market fresh and processed products.

Another type of diversification derives from reorienting institutional markets towards local food purchases. Institutional food markets like schools or hospitals could, as a matter of policy, source their food needs from urban and peri-urban suppliers, thus supporting the local economy and providing an incentive to producers to continue their agriculture (FOLU 2019).

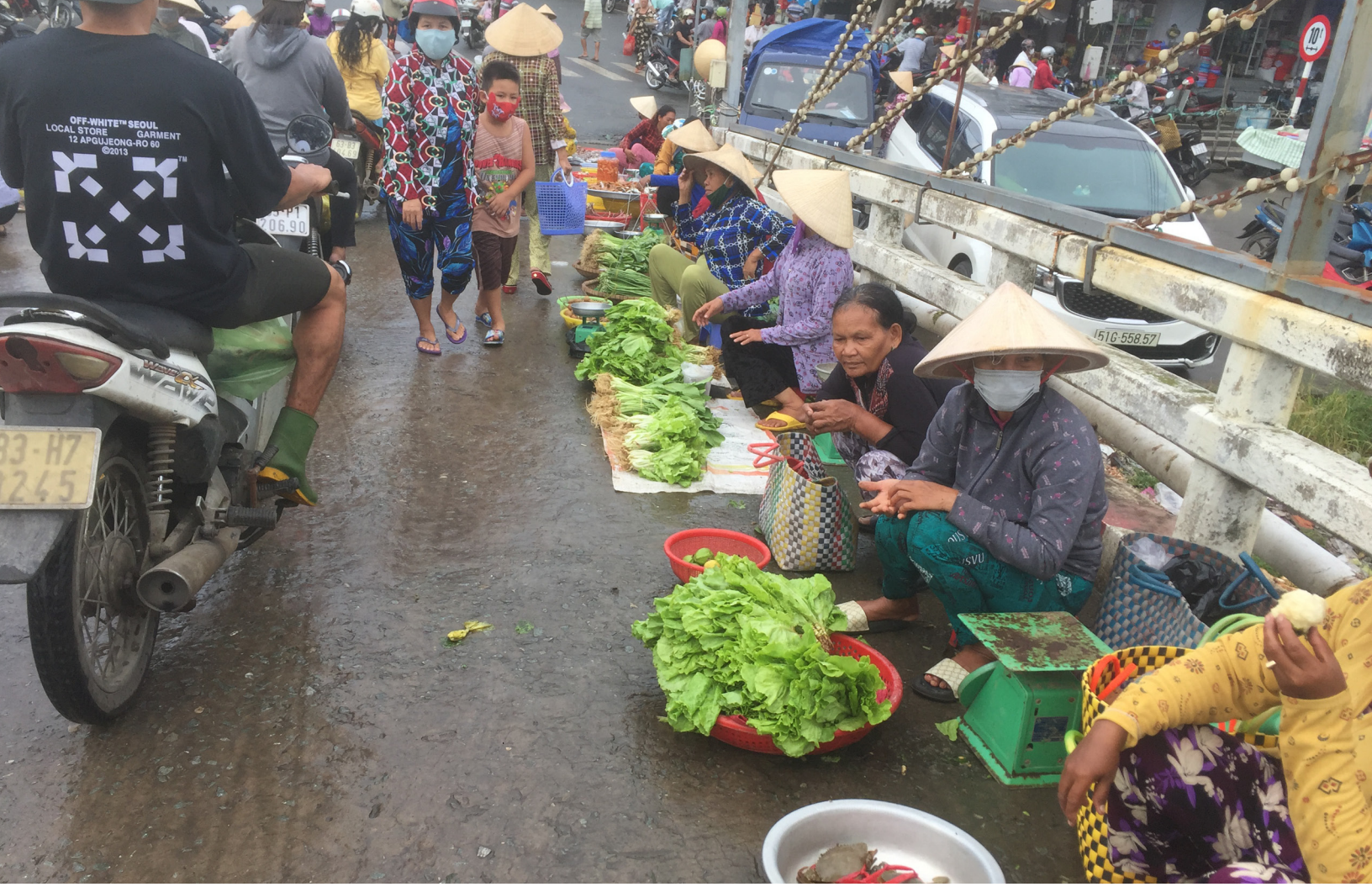
Market upgrading

The access problems, hygiene issues, and gender inequality of many inner-city markets discussed in Chapter 4 require different kinds of market upgrading to benefit producers, vendors and consumers. This would be primarily designed to improve accessibility, hygiene, cleanliness and organic waste recovery through construction or upgrading of toilets and wash areas, especially for women, use of tiling, and expansion of raised stalls.

Decentralization

Where upgrading cannot solve problems of access or health and safety for local vendors and consumers, there is an option to decentralize. Most urban areas have both central wholesale markets and small local markets.[25] To relieve the congestion and unequal access of some central markets, the aim of decentralization would be to construct intermediate satellite markets that are larger than local markets, and nearer the interface with peri-urban agricultural

[25] Bangkok has 3 main central fresh food markets and 337 small local markets (Boossabong 2018).



Roadside vegetable vendors, Can Tho City, Viet Nam (Photo by Ly Cuoc Dang).

production and new informal settlements.[26] Market decentralization needs to be undertaken with intensive stakeholder consultation, to avoid undermining livelihoods, infringing rights and dislocating the local market system.[27] Municipal efforts to unilaterally relocate markets and vendors to new locations on the periphery of cities can create serious social upheaval.[28]

Markets as knowledge centres for healthy diets

Since wet markets and the vendor networks are major sources of fresh food for poor urban residents, they can also be effective sources of knowledge about healthy diets. This is one component of efforts to promote improved nutrition in Bangladesh through innovations in market systems (USAID 2019).

[26] One model for these satellite retail markets in cities is the 'village supermarket' designed and built in the city of Khulna in southern Bangladesh through support from the INGO SOLIDARIDAD. The design provides sufficient space for selling, accessible toilets and washroom areas for women and men to maintain better hygiene, an area easier to clean than conventional markets, reducing the risk of food contamination, and easier to recover organic wastes for use in composting https://www.solidaridadnetwork.org/news/village-super-market-a-facility-for-improving-food-systems-in-bangladesh/

[27] The main stakeholders to be consulted include vendors, producers and consumers, but also market committees and local government officials (Song and Taylor 2018).

[28] Unilateral closing down of the existing inner city wholesale market in Lima, Peru and transferring it to the periphery was very unpopular in Lima, provoking massive protests from wholesalers, retailers and customers. The failure to build a promised retail market next to the new wholesale market led to dislocation in the market system.

Innovations can include repositioning 'healthy food' vendors in markets for high visibility; providing incentives for the display of visual nutrition materials and holding 'nutrition and hygiene learning corners'[29]; introducing special access times to the market for women only; and private sector mobilization of mobile vendors to market healthy food and nutrition messages to informal settlements.

Producer and vendor capacity development

An essential part of market repositioning is the capacity development of market chain actors through concerted action of local government, private sector, and civil society.[30] Main capacity strengthening areas include entrepreneurial skills development for producers and vendors,[31] hygiene, food handling and food safety practices (Grace 2015), and training in digital communication technologies to improve producer/vendor coordination and communication on demand and supply, benefit sharing, and reduction of waste and losses.

5.7 Strategies for the safe recovery and reuse of organic wastes as key components of urban circular bioeconomy

In response to climate change, there is intense pressure on leaders of urban areas to reduce the carbon footprint of their cities. In late 2021 and in early 2022, the pressure was ramped up further with COP 26 and the release of the IPCC report (IPCC 2022). One of the most urgent and feasible ways to reduce the carbon footprint is to move cities from a traditionally linear mode of resource input and waste output to a circular mode of resource input, resource recovery, and resource reuse. This is crucially combined with an overall reduction in consumption and waste.[32] UPA contributes significantly to achieving this transformation through innovative approaches to the circular bioeconomy (Palahí et al. 2020) which have been under way for some years (Drechsel et al. 2015).

[29] In some green markets, learning corners have often been established to share information about food production, conservation, processing and preparation. These can be established through cross-sectoral cooperation between health and commercial agencies of the city.

[30] This is part of recognizing that food production, wholesale and retail are major sources of work for poor urban residents, and it ensures that these workers take full opportunity from upgraded market infrastructure and functioning, as has happened in Indonesia (Song and Taylor 2018).

[31] This would involve adapting existing training materials and experiences in producer business skills development acquired in Asia over 6 years (CIP 2017).

[32] Though space limitations does not allow to elaborate, there are a wide range of tested approaches to waste reduction, some involving direct contributions from UPA via short value chains with lower food losses and waste, assisted by digital communications linking producers and vendors, as discussed in Section 5.6. For a fuller discussion of waste reduction, including through UPA, see Senanayake et al. 2021.

Safe use of wastewater for agriculture

As discussed in Sections 2.1 and 2.4, wastewater is widely used in urban and peri-urban areas in Asia and contributes enormous quantities of urban nutrients to agriculture, reducing the use of synthetic fertilizers, and is thus already a significant component of the urban bioeconomy. However, in almost all low-income countries in the region, wastewater use is informal and carries potential health risks, as mentioned in Section 4.7.[33] Large scale treatment plants are expensive to build and to maintain. To enable UPA to continue to benefit from the nutrients in wastewater in a safe and sustainable way, UPA use of wastewater needs to be understood in food system terms and to apply a "multi-barrier" control process as recommended in the Hazard Analysis and Critical Control Points (HACCP) approach advocated by World Health Organization (WHO 2006; World Water Assessment Programme 2018). This involves treatment on farm, but also monitoring and control procedures along the supply chain, for example in wet markets, in street food outlets, etc. To make on-farm treatment accessible and feasible, it is recommended based on accumulated experience that it be decentralized and made up of two kinds of low-cost investment: small-scale field treatment and changes in irrigation practices. Both require strong focus on farmer capacity development and changes in the type and implementation of regulations (Keraita et al. 2010).

Partial or complete removal of pathogens from the water prior to use on crops can be achieved through the small-scale filtration, usually involving sand filters, or through sedimentation. This ranges from more complex and expensive three-tank systems, with contaminated water entering one tank, standing and sedimenting in the second tank, and the water in the third tank being used for irrigation. There are also simpler, single sedimentation ponds leading to partial removal of pathogens before the water is used.[34]

The other category of innovations involve modification in the application of the wastewater to reduce contamination of the crop (Keraita et al. 2010). This includes drip irrigation, though this is susceptible to blockages, or simpler techniques such as furrow irrigation, or changes in the application techniques. Large-scale urban and peri-urban farmer training in both simple treatment and improved irrigation practices needs support and financial and marketing incentives put in place to both increase the numbers of farmers following the new practices but also helping to differentiate the quality of products in the market. Municipal governments need support to help producers take advantage of this key urban resource whilst protecting public health. HACCP

[33] One study estimates that 34% of the 36M litres/day of wastewater produced in 498 of India's larger urban settlements is treated (Kaur et al. 2012). This may be an overestimate. UN-Water considers that perhaps 80% of the world's wastewater is untreated.

[34] Where land is expensive and limited, occupying part of agricultural land with one or more ponds or tanks is a significant loss for the farm household and options exist for compensating the loss of land through dual use of the ponds for aquaculture (Moscoso et al. 2007).

Reuse of vegetable waste as pigfeed, Hanoi, Viet Nam (Photo by G. Prain)

monitoring systems can be established to ensure that the WHO guidelines are followed not just at farm level, but along the food supply chain.

Recovery, reuse and recycling of solid organic wastes

The enormous quantities of solid organic wastes generated in Asian cities[35] contain nutrients (nitrogen, phosphorus, potassium and others) and organic matter that can be used for feedstock, soil improvement and crop fertilization (Senanayake et al. 2021) Use of these wastes as **feedstock for swine** is an ancient use which is still widespread in Southeast Asia. There are standard safety practices, for example in commercial use in Japan and South Korea, which need to be scaled to other countries. Large-scale capacity strengthening is needed among informal livestock raisers around the length of cooking time for the wastes before feeding, and filtering processes to extract non-organic contaminants. Training sessions should also involve local health workers to improve knowledge of mutual concerns and a cross-sectoral approach to reaching safe, profitable local production of animal source foods.

[35] Organic wastes from commercial and domestic food users or from industry constitute well over 50% of total wastes in many low- and middle-income countries in Asia and the Pacific (Kaza et al. 2018).

Novel enterprises that can use organic waste as feedstock include the production of **gourmet mushrooms**, which can also use organic wastes such as coffee grounds that are not usable for animals. An increasingly important use of organic waste-based feedstock is for **insect rearing**, with the final product used variously as high nutrient animal feed, fertilizer, medicinal ingredients and future human food.[36]

Compost-making initiatives can be a source of employment for the urban poor, from the collection of market, domestic and commercial organic wastes to processing activities and eventual sale. Despite the mostly free and availability of the raw material, local authorities are hesitant to invest in large-scale composting because of the difficulty of recovering their own costs. Both for the public and private sectors, there is a need to monetize the social and environmental benefits of composting through subsidies. At present, these benefits are fully internalized by the society (Muspratt 2016). Senanayake et al. (2021) identify three alternative types of composting that will be appropriate for scaling under differing circumstances: on-site composting/energy recovery;[37] social community composting likely to be dependent on public sector financing;[38] and off-site compost and energy recovery, often involving public–private partnerships.[39]

5.8 Increasing climate resilience

As mentioned under Section 4.8, urbanization and climate change are closely linked. Cities are not only main contributors to climate change and suffer most of its impacts but also hold important competencies (IPCC 2022) to act on climate change (e.g., authority over land use zoning, regulation of energy supply and industrial emissions, waste management, and water services). Moreover, the co-benefits of climate change adaptation measures are largest in cities: adaptation actions can more easily be linked with local development objectives and have more positive effects, for example, on poverty reduction, improved sanitation and basic health, and enhanced food security and nutrition. In addition to efforts to establish "low carbon" growth and to prepare for climate uncertainty and disasters triggered by natural hazards, World Bank (2010) also makes a plea for innovative "outside-the-box"

[36] Black soldier flies are reared in this way by private businesses or public–private partnerships. Private companies raise cockroaches in the PRC, also used in Chinese medicine, pharmaceutical uses and as animal feed. In many parts of the world, insects form a traditional dietary ingredient.

[37] This envisages the use of composting machines, anaerobic digesters or a bokashi system (fermentation technique) to process mostly large volumes of on-site wastes associated with large enterprises. Household-level composting has been widely promoted in the Global South with mixed results (Sewak et al. 2021)

[38] A community enterprise depending on volunteers collecting wastes or the public dropping off wastes at a central facility.

[39] In an analysis of 13 municipal compost plants in Sri Lanka, operational cost recovery appeared to be seldom covered and varied in large margins from 3 to 106%, due to poorly developed compost market strategy (Fernando et al. 2014).

solutions. UPA or UPAF, to explicitly add the role of urban (agro-) forestry, can play a strong role in enhancing food security for the urban poor, greening the city and improving the urban climate, while stimulating the productive reuse of urban organic wastes and reducing the urban energy footprint (Dubbeling et al. 2019).[40] This includes reducing food miles, fertilizer use and energy consumption, and urban heat island effect; and providing better diets, urban food security, jobs, and income (reducing vulnerability).

National and local government institutions directly concerned with urban development can play a proactive and coordinating role here, and may take measures such as integrating urban food security and UPA into climate change adaptation and disaster management strategies; land developments; city water(shed) management plans; or protecting and stimulating UPAF in flood zones and wetlands and on steep slopes in order to prevent construction in such areas and to reduce run-off (as done in Gorakhpur, India: RUAF 2014).

The Kathmandu Metropolitan City (KMC) in Nepal has been promoting rooftop gardens in the city since 2012. By promoting household waste recycling, urban waste volumes that otherwise would end up in the landfill are reduced. KMC trained over 500 households in rooftop farming, built demonstration rooftop gardens, and formulated a rooftop garden policy (RUAF 2014). Many cities, such as Kesbewa in Western Province of Sri Lanka promote the preservation and protection of green and productive areas on stream banks to reduce flood risks. And as part of its Urban Master Plan (2005-2020), the city of Beijing in the PRC aimed to preserve farmland and green spaces, designate permanent green areas in city fringes and corridors, promote wastewater recycling, rain and flood water harvesting, protect forest areas and parks, and certify and subsidize energy-saving production (Cai et al. 2022).

5.9 Strategies to address urban agriculture and food finance bottleneck

Strategies broadly fall under two categories: (i) improving the financial sector itself, and (ii) generating a more enabling financial environment. Both strategies tend to bridge the gap between the limited demand from poor urban farmers and communities and a restricted offer from the financial sector.

[40] https://www.veolia.com/en/solution/urban-farming-solution-helping-feed-cities

Improving the financial sector and its volume of resources

Various positive mechanisms have been put in practice in Asia and beyond:

(i) **Untapping financial resources towards urban agriculture** primarily from: (i) *Rural agriculture loans*; (ii) *Housing loans and subsidies,* e.g., Kerala, for turning the house and its back of front yard more productive (sheds to raise animals where allowed; home-based agro-processing activities; vertical gardening); (iii) *income-generating and job-creation* loans and subsidies; (iv) *Low-income neighborhoods' improvement resources* that again rarely consider urban agriculture. CODI[41] in Thailand is interesting as it includes support to urban agriculture and food-related activities through grants and loans as part of its program. City Food Program impact in Bangkok and more recently in Cheng Mai cannot be understood without CODI despite its limited resources.

(ii) **Evolutionary loans for improvement of productive homes** with decreasing levels of subsidies that allow the loan taker to pass through a couple of lending cycles from a high level of subsidy to a conventional banking loan. Such a practice has already been successfully implemented, but not in Asia so far.

(iii) **Creation of community banks** (with an urban and food component) that can include local currencies to stimulate local consumption, which have been spreading in other regions in the world, and much less in Asian cities.

(iv) **Credits for consumption** (with a mix of local currencies and national ones) of locally produced or transformed food. These have been highly successful and were crucial to generate a locally sustainable financial system. These are limited in Asian cities and raise, once again, the issue of international exchange of practices.

Generating an enabling financial environment

The following practices differ from the previous ones, as these primarily contribute to generating a positive environment that in turn impacts the performance of the financial sector:

[41] The Community Organizations Development Institute (CODI) is a Thai Government institution whose mission is to support the strengthening of communities and their organizations – in both urban and rural areas – as key agents of change and as central actors in development which affects their lives and communities. Besides budget from the government which supports many of its ongoing programs, CODI's chief financial tool is the CODI revolving fund, which provides soft loans to community cooperatives and community networks to undertake a variety of development initiatives they plan and implement themselves. These initiatives include housing, land purchase, livelihood, community enterprise and many others.

(i) **Increasing security of tenure and access to urban land for farming** (developed in Section 5.3)

(ii) **Creating or strengthening of formal organizations and confederations of producers**. One of the challenges faced by urban farmers and producers is that they are often not legalized and are considered informal. As a result, they are not eligible for most of the formal banking systems and public institutions. One solution implemented in various cities is for urban farmers to organize and join formal associations, usually along "commodity products" (chicken, vegetables, fruit, fish, etc.). These associations as formal are better recognized by the banking sectors and play an interface role with informal producers.

(iii) **Providing technical support to urban farmers for formulation of business plans**. Urban farmers are often reluctant to try to get loans because of their expressed limited capacity to formulate a business plan that does not go against their own interest. At the same time, financing institutions repeatedly express the limited capacities of urban farmers at that level. Technical support to help out those farmers and communities who wish to enter market orientated activities, has been quite successful and opened up the doors of different banking institutions.

(iv) **Participatory budgeting**. Participatory budgeting is a mechanism by which the population defines the destination of part, or the totality of public resources. It emerged in 1989 in Brazilian municipalities and expanded since then, in hundreds of local and provincial governments, notably in Asia where people can prioritize projects with public resources: Indonesia (Rifai et al. 2016); the PRC and notably in Chengdu; Penang in Malaysia; and the Republic of Korea, to name a few. Interestingly, urban and peri-urban food and urban agricultural projects are increasingly eligible to participatory budgeting.[42] In addition, some participatory budgeting initiatives in Asia have introduced a strong *gender perspective* while others focus on climate change adaptation and mitigation. In relation to finance, some participatory budgeting initiatives can provide communities a down payment to a Public Investment Fund as in Chengdu.[43]

[42] This is the case for instance in Metropolitan Chengdu where close to 4,000 villages and settlements from rural districts have been benefiting from resources to strengthen their agriculture and productive infrastructures such as roads or rehabilitation of irrigation channels and income generating activities.

[43] In Chengdu communities from peri urban settlements can use part of their participatory budgeting resources to secure a medium-term loan, borrowing against their own future allocation. Villagers can select projects up to the value of their allocation or decide to get a loan from Chengdu Small Town Investment Company, a public investment fund, allocating either a portion or all of their participatory budgeting funding to a down payment for a loan. They can obtain loans that are seven times their participatory budgeting allocation to invest in an agreed project decided through this approach, and the loans are repayable over seven years.

(v) **Urban agriculture insurance system**. Financial institutions are reluctant to provide loans to farmers, considering the risks associated to the loss of crops in case of climate calamities. Insurance systems for urban farmers emerge as a crucial factor for generating a positive financial environment, e.g., Beijing (Cai and Guo 2010) or Shanghai Minhang District (Cai et al. 2010). The interest demonstrated by small-scale urban and peri-urban farmers has been so high that thousands started again and/or expanded food production, and the insurance system became self-sustainable.

5.10 Strategies for strengthening urban food system governance

UPA involves multiple interactions across a complex network of food system actors that extend across city regions, involving food production, processing, marketing, and consumption. It is also influenced by a wide range of policies and regulations formulated and variably implemented by nested authorities at local, provincial and national levels. In the specific contexts of Asian city regions, urban food systems are a result of the interplay and negotiation of these horizontal and vertical processes. They are rarely shaped through deliberate political, organizational and administrative processes. This means that providing oversight, strategy and a framework for planning and policy formulation needs maximum consultation with the wide range of actors involved in the food system. Together these different actors contribute to urban governance.[44]

Food Systems governance through multi-sectoral consultation

External investment should focus on facilitating the participation of a wide variety of stakeholders across multiple sectors to improve the quality of the policy and programme design and enhance commitment to implementing policies and regulations. Among the different stakeholders that need to be involved, it is important to ensure the direct participation of the various types of value chain actors, including women and men producers, informal and formal food vendors and associations, consumer groups, all levels of government, the private sector, civil society organizations and academics. Drawing on positive experiences with multi-stakeholder platforms and

[44] "...the range of political, organizational, and administrative processes through which stakeholders (including citizens and interest groups) articulate their interests, exercise their legal rights, take decisions, meet their obligations, and mediate their differences." (Arena, Genco and Mazzola, 2020)

forums in Surabaya and other cities,[45] food policy councils in South America (Cabannes and Marocchino 2018), "open dialogue meetings" in Solo, Indonesia (Song and Taylor 2018) and both formal programs and looser types of consultations in Bangkok,[46] as well as lesson-learning where full consultation has not taken place, as in Colombo,[47] it is possible to support participatory strategy development, policy design, and action planning.

An Asia-wide regional assessment of urban food systems (Acharya et al. 2020) provides a three-way scale to determine the quality of multi-sectoral consultation to help to assess effective food system governance. **Integrative governance** captures the need to ensure that dialogue for policy and planning involves stakeholders from different sectors and specializations and is especially well-coordinated across public, private and civil society entities involved in food issues and also vertically between levels of government (Halliday et al. 2019). **Inclusiveness** refines that idea and addresses the need to include the vulnerable and disadvantaged, which means hearing and responding to the voices of poor women producers and youthful vendors for example. Finally, and critically, multi-sectoral dialogue and governance more broadly needs to be **proactive**, forward-looking to identify future food-related problems and opportunities. A series of indicators are available to measure these different dimensions, to help monitor progress by cities towards high quality food systems governance. Based on responses from 171 cities in 2019, it was found that only 8% of Asian cities surveyed were high performing across all three dimensions—"food smart cities" in the study's terminology.

Addressing urban food as a system

The same assessment identified more proactive governance actions in relation to food production within urban and peri-urban areas rather than in relation to marketing or consumption. It found that 65% of cities have extension programs for farmers, 62% include zoning for agriculture, and 41% propose allocations or subsidies for urban farms. This is a positive sign and may reflect the recognition of the nutritional contribution of UPA, but it may indicate that local governments are perceiving UPA as separate from the urban food system since less policy attention is given to distribution and much less to consumption. Clearly support is needed to promote the interdependence of elements of the food system and for a louder consumer and vendor voice in the consultation and dialogue processes.

[45] Tefft et al. 2020. In 2018, Surabaya, Indonesia, convened a multi-stakeholder forum to draw up its new Food Security and Nutrition Action Plan (RUAF, GAIN, 2019), with the active participation of relevant city departments, the private sector, civil society, non-governmental organizations, academia, and the media.

[46] Bangkok demonstrates more effective governance through a clear recognition that urban food systems are too complex to be governed by a single authority. It also demonstrates the importance of vertical connections with national government, but the key role of informal dialogue and programmatic action at the city level (Boossabong 2018; 2019).

[47] Colombo, Sri Lanka provides an example of a city region where limitations on stakeholder interactions and dominance by one actor constrained governance processes (Dubbeling et al. 2016).

The importance of a food systems governance vision that embraces both vertical and horizontal consultation and cooperation

From different experiences with multi-stakeholder consultations and dialogue, what emerges is the complementary importance of vertical and horizontal linkages involving national regional/metropolitan and local stakeholders on the one hand, and peer-to-peer coordination between local authorities, civil society organization and the private sector within city regions on the other, in organizing food supplies, food safety, and food access (Tefft et al. 2020).

National agencies can support city food governance through the development of national food policy frameworks, as occurred in Kenya (Tefft et al. 2020) and conversely, innovation in urban food system governance in one city can influence national policy. One tool that can support horizontal governance processes and food planning to support benefit-sharing is the capacity to visualize the food system across the urban and peri-urban space of cities, using remote sensing to identify production areas and food deficit areas.[48]

As stakeholders engage in the processes briefly described above, they may well develop strong interest to sustain in the long term the capacity for dialogue and joint planning involving both vertical and horizontal relations. An ideal outcome of the process is the establishment of a more permanent food governance platform. Food policy councils and similar platforms that seek to improve the food system through organized public policy action have a history stretching back over several decades in North America, and they are now spreading to cities in the Global South (RUAF 2019). Experiences and models are available to help scale up this important institutional innovation to contribute to more sustainable UPA and urban food systems and more resilient cities.

A source of experience and tools for food systems governance is the Milan Urban Food Policy Pact (MUFPP). The MUFPP promotes a governance framework for local food systems and participatory monitoring and decision-making, and has already been signed by over 200 cities around the world. Because the MUFPP provides cities with these tested food systems tools and approaches, more cities in Asia need to be encouraged to join this network.

[48] Pioneering work has been done on this issue in Baltimore, USA from which cities in Asia can learn (Misiaszek et al. 2018).

CHAPTER 6: Implementation and Funding Recommendations

6.1 Strengthening Knowledge and Capacity

Mainstream UPA within ADB through the following processes:

(i) Formulation of an ADB UPA Policy document that would expand and develop various proposals to increase the visibility and understanding of UPA among ADB staff; and

(ii) Establishment of a UPA community of practice or node to organize seminars and city consultations to develop the capacity of ADB staff in different dimensions of UPA and to clarify demand for UPA investments.

Provide technical assistance to national, municipal and other actors in the following areas:

(i) Building **awareness** on the contribution of UPA to pro-poor urban resilience through food provisioning, income opportunities, climate change mitigation/ adaptation and the urban circular bioeconomy;

(ii) Strengthening **knowledge** about how to scale up UPA to enhance its contribution; and

(iii) Undertaking **pre-feasibility and feasibility** studies on UPA support and scaling drawing on existing participatory assessment tools.

Incentivize uptake of UPA in Asian cities through:

(i) Establishing a **financing partnership facility** to mobilize resources to help member countries expand understanding and targeting of UPA investments;

(ii) Setting up an **international exchange program for Asian cities** and actors for exposure to cutting-edge experiences, innovations and skills in UPA governance, planning, financing and technical support across the world;

(iii) Facilitating expanded Asian membership of existing city networks, such as, primarily United Cities and Local Governments for Asia Pacific Region (UCLG-ASPAC) C40 and the Milan Urban Food Policy Pact (MUFPP); and

(iv) Catalyzing increased collaboration with international organizations with expertise in UPA at global level such as FAO, RUAF, and the new CGIAR initiative on Resilient Cities in which two of the authors of this report are involved. Other Asia-specific networks also offer collaborative opportunities such as the Asian Coalition for Housing Rights and the Community Architects Network.

6.2 Support for Policies to address policy barriers on implementing UPA

(i) Barriers affecting inclusion of UPA in urban planning, such as the absence of food related activities in urban zoning, urban codes and standards, marketing regulations, difficulty of identifying food planning needs across widely varying urban context

(ii) Barriers affecting UPA in the agricultural sector, such as attention to urban agronomic needs, extension support, organic production skills, etc.

(iii) Barriers affecting UPA in existing urban governance processes, including lack of policy coordination across different urban, peri-urban and rural jurisdictions within city regions, lack of consultations on food policies with food system actors, and lack of vertical integration on food production between municipal, regional and national authorities

(iv) Barriers affecting access to land and maintenance of strategic crop land in and around cities

6.3 Support for Investment

Provide financial support focusing on improving UPA financial mechanisms

(i) **Evolutionary loans**, with decreasing levels of subsidies for women and men producers and informal micro and small food marketing businesses, targeting especially women

(ii) **Micro-credits** adapted to farming cycles

(iii) Facilitation of an **improved and supportive financial environment** for producers (e.g., increase land security of tenure, fiscal incentives, participatory budgeting), for vendors (inclusive, healthy market environments) and consumers (credits to institutional consumers like schools, hospitals for purchasing locally produced/ transformed food).

Provide financial support focusing on improving UPA financial and banking environment

(i) Provide **grant resources** to test/pilot integrated solutions on UPA (that combines a range of social, technical, planning, and financial approaches)

(ii) **Finance** UPA-related outputs as part of wider urban sector loans

(iii) **Provide financial packages** with diverse combinations including:

a) **loans** for funding municipal basic infrastructure, such as market upgrading, organic waste recycling facilities, simple wastewater treatment, and for accessing land for urban agriculture;

b) **collective and individual micro credits** for production and marketing; and

c) **grants** to stimulate community-led kick off activities, especially in production and waste reuse activities.

(iv) In the short term, **deliver financial packages on a first set of cities and countries** that have already pro-poor urban agriculture programs, which could be scaled up and become reference cases for a second round of cities.

(v) In the longer term, **create an Asian based funding facility for UPA** that will channel a mix of funding and subsidies for, among other things, small grants to subsistence and small-scale market agriculture; revolving local funds; grants for technical advice and support to business plans for producers and vendors; guarantee funds and insurance facilities.

Appendix 1: Bangkok City Farm Programme

A.1.1. Context: Bangkok Urban and Food Challenges

(i) Rivers are part of the city life, wealth, and threats. Bangkok's Chao Phraya River remains a source of life and nourishment and central to development of agricultural sector.

(ii) Very extreme population density: inner Bangkok 3662 pp/km2 and 1542 for Bangkok Metropolitan Area

(iii) Sizeable agriculture land still surrounds Thailand capital. As cited by Piyapong Boossabong, a 2016 study found that farming households cultivated 37,310 hectares (ha) out of the total land area of 156,522 ha (23.84 percent), with more than half for paddy, producing a significant amount of 125 000 tons of rice.

(iv) In 2009, almost all vegetable and fruits consumed in Bangkok were produced within the city, but this percentage kept decreasing over the years. (Cabannes 2021).

- **Challenges faced by Bangkok Food system**

(i) **Urban growth and development:** Land for farming is more difficult to access and secure in the inner city.

(ii) **Multiple poor environmental conditions:** Excessive river water usage upstream for agriculture purposes; air pollution from motor vehicles and local industries; poor water quality due to untreated sewers dumped into the river downstream; urban and peri-urban underground water contamination and salinization.

(iii) **Increasingly lower quality of food**, moving away from the healthy traditional diet (based on fruits, vegetable, rice, and protein) to processed, industrial food. This shift reduces people's incentive to grow their own food.

(iv) **Floods such as the 2011 one resulting largely from climate change** threaten food production and disrupt markets and peoples' access to food.

(v) **Insufficient education on intensive urban agriculture**.

- **Latest challenges faced by CFP (early 2022)[49] and how they are addressed**

  (i) Connection between producers and landowners to use vacant land (82,318,140 m^2 in total in Bangkok)

  (ii) Increasing the number of land sharing scheme associated with land tax exemption

  (iii) Land accessed so far usually lacks basic facilities and primarily water supply and electricity. Current practices include better use of ground water and solar energy.

  (iv) Weak/illegal/informal land tenure regime, leading to look for long-term leases, mediated by CFP and municipalities involved in CFP

  (v) Dilemma and potential tensions on what kind of urban agriculture should CFP focus upon – self-consumption only? food sharing among poor communities or selling surplus for income generation?

  (vi) Need to increase productivity; find more productive spaces; better division of labor and further improvement of management.

A.1.2 Additional highlights on Bangkok City Farm Programme

The City Farm Programme (CFP) was launched in October 2010, funded by the Food and Nutrition Programme of the National Health Promotion Foundation, part of the Prime Minister's Office. Its emergence was a result of growing concerns about urban food insecurity (poor quality and rising food prices) as well as a positive response to the King's idea of low-input farming in an urban context.

The programme has been granted seven million baht annually (about $235,000) to essentially support urban agriculture projects and a smaller portion to "organizing training courses and alternative food markets, providing inputs, sharing farming knowledge, promoting wide-ranging food initiatives, public campaigns, and fixed and operating costs of the programme" (Mahasarakham University: 2013, cited by P, Boossabong:2018).The programme therefore provides a limited financial support of 30,000 to 50,000 baht per farming project (900 to 1,500 US$ for a duration of 14 months).

CFP gradually connected and supported 225 projects all throughout Bangkok, starting with about 40 in 2010. The subsidy is transferred from the health promotion agency. Interestingly enough, its budget mainly originates from the nationally called "sin tax" (e.g., alcohol products) and the main agency's role is funding public programmes related to health promotion. Through its over ten-year existence, the programme contributed to biodiversity of food as at least 80 different local products are cultivated through the programme.

[49] Communication with Dr. Boossabong, Chiang Mai University and CFP (February 2022)

Financial support is not limited to poor communities and their gardens even if 50 percent of beneficiaries are from informal settlements. CFP also includes school gardens and institutions such as hospitals, factories and their premises.

The Thailand Sustainable Agriculture Foundation coordinates the programme that in turn is managed and implemented through a multitude of civil society organizations and alliances: Green Market Networks, Slum Dwellers Networks and Informal Labor Networks, green food corporations, social enterprises, social activists and community-based organizations (Thailand Sustainable Agriculture Foundation 2011; Hutapate 2010; Boossabong 2011).

A.1.3 Timeline and key dates

1989	Alternative Agriculture Network (AAN)
1997	New Theory of farming promoted by the King Rama: The king promoted growing diverse food in limited areas; explicit concern for ecological balance, self-sufficiency and self-reliance.
1998	Establishment of Thailand Sustainable Agriculture Foundation (TSAF) one year after the economic crisis
2004	BMA establishes city farm learning centre and City Green Farm Project.
2007-2011	Environment Quality Management Plan 2007-2011: Preservation of the green belt and Sustainable Urban Green Space
2009	Working Group on Food for Change (Various civil society organizations, such as AAN, Green Market Network
2009	Development planning for Bangkok 2020 as 'Green and Good Life City' and including Community Vegetable Gardens
2010	Formal launching of City Farm Programme: about 40 initiatives supported
2020	City Farm supports through networks around 300 gardens and initiatives
2020- 2022	A major and recent achievement was the expansion of CFP from Bangkok to other significant cities in the country including Khon Kaen (110 000+ inhabitants), Songkha (60 000 +) and Chiang Mai (± 1 million). In these latter, CFP grassroots and pro-poor activities were complemented with a Food miles survey, a city food strategy (working with 4 municipalities) and a Plan for setting up a pilot on sustainable community gardens with a circular economy approach.

A.1.4 Complements on benefits perceived by CFP of urban agriculture in strengthening pro-poor resilience and access to nutritious food

(i) Significant and highly variable economic value of gardening and raising animals: CFP records in poor communities over a 14-month range indicate values varying from 8,856 Baht/ US$268 (vegetables gardens) to 157,980 Baht/ US$4,785 (chicken farm).

(ii) Reduction of food expenses from 10% to 50%

(iii) A major focus and success is that all food produced under CFP is organic, and therefore nutritious and is *accessible for the very poor*. It positions urban agriculture as a niche production in a country where organic food is less than 0.5 % of total production.

(iv) Reduction of city organic waste management cost (from 1,900 Baht/ US$58 to 3,870 Baht/ US$118 per garden)

(v) Development of the training activities > 6 Urban Agriculture Training units, complemented with one mobile training team

- **Providing food for the most vulnerable people during disasters:**

Another unique aspect of the food programme lies in its capacity to increase pro-poor food resilience in crisis situations primarily floods, COVID -19 (Bangkok Post: 31 May 2020):

> *"While the most vulnerable households, such as the urban poor and the marginalized groups, did not receive specific attention from the mainstream food aid system, the networks on urban agriculture involved in the City Food Programme prioritized, as a policy, their support to them. As vegetables were rare and very expensive during the 2011 flood period, the networks mainly provided vegetables collected from local sources and the urban agriculture projects developed by them." (Dr. Boossabong)*

- **Gender perspective and women's role**

In terms of gender division of labor, men play a key role in physical harder tasks (e.g., preparing soil, digging, ploughing, harrowing, use of machinery) whereas women are dominantly taking care of the crops (watering, spreading bio-fertilizers, weeding), as well as cooking / preparing food for sale, or marketing. Women and men join efforts when harvesting. Taking localized gender division of labor is essential when considering loans or grants, to strengthen women's role as introduced in CFP.

Appendix 2: The Urban Agriculture Program and the Green Belt Program in Rosario, Argentina[50]

When Argentina's economy collapsed in 2001 and the incomes of more than half of its population dropped below the poverty line, the Municipality of Rosario responded with the Urban Agriculture Program (or PAU: Programa de Agricultura Urbana). As part of the PAU, low-income residents have been given access to underutilized and abandoned public and private land to cultivate food, and spaces are created throughout the city for several permanent and pop-up markets. Originally intended to alleviate food scarcity and to provide economic opportunities, over the years the program evolved into a cornerstone of inclusive climate action planning. Today, PAU includes seven vegetable garden parks (Parques Huerta) and various neighborhood plots that were formerly underutilized or abandoned land. The programme has also expanded into Rosario's peri-urban area as part of the Rosario Green Belt Project, and is guided by a new land use ordinance. Almost 2,500 tons of fruits and vegetables are agro-ecologically produced in Rosario each year. Localizing vegetable production creates 95% fewer greenhouse gas emissions than if they still would be imported. The PAU of the Municipality of Rosario won the 2020-2021 Prize for Cities[51], which spotlights innovative approaches to tackling both climate change and urban inequality.

A.2.1 Background

Rosario is a secondary city in Argentina, with over one million inhabitants, 300 kilometres northwest of Buenos Aires and strongly influenced by the capital city economy. Before the turn of the century, job losses and poverty increased under the extensive privatization and deregulation programs, but when the country's economy collapsed in 2001, a quarter of Rosario's workforce was suddenly unemployed, and more than half of its population dropped below the poverty line. Rosario is still home to some 136,000 informal settlers living in 91 communities and continues to attract migrants from rural areas.

The Municipality of Rosario responded with the PAU (part of the Rosario poverty programme) and teamed up with a local nongovernmental organization, the Centro de Estudios de Producciones Agroecológicas (CEPAR) and a national program, Pro Huerta, which supports family gardens. Under PAU, Rosario began supplying local groups with tools, materials, seeds and provide training on agroecological production. Across the city, PAU repurposed underutilized land into agricultural plots and vegetable gardens, and set up permanent markets to establish urban farming as a new

[50] Based on several articles in the UA Magazine, by Raul Terrile, Antonio Lattuca, Mariana Ponce, Laura Bracalenti and Laura Lagorio, Urban Agriculture Programme, Municipality of Rosario

[51] See WRI website: https://www.wri.org/news/release-prize-cities-awarded-rosario-argentina-improving-resilience-and-equity-through-urban

source of livelihoods. The municipality also used the program to foster a deeper culture around food production and carry out social programs, including for education and youth development.

A.2.2 Land Planning

Rosario's approach was to reserve underutilized and degraded land for urban agriculture which shows that the goals of density and equitable urban development can be compatible and mutually beneficial. Green spaces within and around the city boost the density of the inner city by preventing further urban expansion, while sustaining livelihoods of low-income residents and yielding climate benefits.

PAU consolidated UPA as a legitimate urban land use and a strategy for social and local economic development through:

(i) organizing and implementing UPA projects related to production, processing (in agro industries), and marketing;

(ii) optimizing use of vacant land areas for agroecological farming;

(iii) facilitating and formalizing access to land for urban agriculture of both occupied and potentially useable plots; and

(iv) designing use of different public spaces (roadsides, flood areas, public squares) for UPA.

In an integrated and participatory way, PAU with the Centro de Estudios del Ambiente Humano (CEAH — human environment studies centre) the National University of Rosario, CEPAR, and several municipal departments — such as urban planning and property registry — collaborated to analyse the available vacant land in the city. New forms of urban land use were supported on land that was in poor condition. Attention was also paid to soil improvement techniques. The municipality created spaces throughout the city for several permanent and pop-up markets, where urban farmers could sell locally grown produce and homemade goods like pickled vegetables, sauces, syrups, organic cosmetics and preserved fruit and jams. The participatory approach contributed to greater participation and appropriation of the results by the population. Planning and scheduling of activities took into account municipal planning and deadlines but also community availability and processes.

These new forms of urban space were:

(i) flood areas or road reserves turned into garden-parks, integrating different activities and users, including ecological services, as well as education and leisure;

(ii) productive squares, designed for recreational, productive and commercial activities;

(iii) productive streets, which allow for farming on roadsides, including selling and bartering, and food trees and aromatic herbs; and

(iv) demonstration gardens, which focused on training, but also provision of visibility.

The municipality has expanded UPA into public spaces, schools, marketplaces and a variety of social programs, especially those for youth and elderly, establishing a culture around food production. Vegetable Garden Parks in low-income communities were vehicles for change, like (other) social programs, and education.

Rosario included space for home and/or community gardening in new public housing projects and slum-upgrading schemes. Housing design and plot regulations can take into account (micro-) farming requirements, for example: including grey water recycling in building design; accommodate growing on exterior walls and windowsills; balconies to maximise solar access; or flat roofs that are designed with enough structural integrity and mechanical servicing to accommodate the use of an agricultural rooftop garden or greenhouse in the future.

A.2.3 Governance

Over the years, Rosario's PAU evolved from an approach to put food on the table, to a tool for job creation, and more recently to a strategy for tackling climate change. It is now fully integrated into Urban Planning of Rosario, its 10-year Strategic Plans of 2008 and 2018, and the Environmental Plan of 2015.

The PAU is hosted by the Department of Social Promotion, with a staff of over 30 and a budget almost reaching half a million US dollars. PAU brings together farmers, municipal officials, agricultural experts, and representatives of non-governmental organizations. Consolidation of the process is reached through incorporating UPA into the City Strategic Development and Master Plan, and a set of ordinances. In the Rosario Master Plan, UPA is recognized as a permanent and legitimate use of urban land and its integration into other public activities and projects related to management of green areas, equipment, housing, infrastructure, transportation, etc. is promoted.

To formalize the temporary cession of property for UPA, a regulation approved in September 2004 put the PAU in charge of the information bank that controls the use of vacant land for farming. Further, zoning ordinances regulate use of agrochemicals, and protect agro-ecological farming against industrial farming or other land use in the green belt.

Using a long-term vision and incorporating UPA into strategic plans, Rosario manages to use the multiple functions of UPA, as part of resilience (PAU reduces carbon footprints, increases resilience to climate risks, generates jobs, and enhances social inclusion).

A.2.4 Solidarity-based economy

As part of PAU, several activities are employed building a solidarity-based economy, which is understood to promote the flow of resources at the local level, and connecting local actors. Individuals, families and social organizations exchange goods, values, know-how, and culture, based on the principles of solidarity, and build markets where the prices and relationships are more oriented toward integration and equity than financial profit. The PAU supports urban growers by providing technical assistance, subsidies and training and supplying inputs and basic infrastructure for production, processing and commercialization. In densely built-up neighborhoods and where space often limits the size of the production unit, no-space, low space technologies offer tremendous opportunities for space-confined growing (see for more information on such

technologies also Urban Agriculture Magazine 21). Growing plants in containers, keeping small numbers of animals in cages, and vertical cultivation (cultivation towers, hanging plants, containers attached to the wall, use of trellises) are all practiced.

UPA became an alternative income source, both by saving money and by growing their own food, as well as by selling surplus crops. PAU commercialization support included the identification of various selling points, and supporting the formation of the Network of Urban Farmers (Red de Huerteros y Huerteras). The following market channels have been established:

(i) the urban home garden itself that also includes direct sale of produce;

(ii) in the neighborhood, to neighbors of the gardens, or with a sales cart;

(iii) weekly farmers' markets of which there are currently six operating from Monday to Friday in different public spaces in the city;

(iv) door-to-door delivery of approximately 6 kg bags of organic vegetables;

(v) local supermarkets, where the products are displayed in an exclusive section;

(vi) sales to agro-industrial produce and natural cosmetics companies promoted by the Programme; and

(vii) specialty stores sell primarily trays of processed organic fruits and vegetables.

The farmers' markets appear to be the most appropriate space for small and medium-sized urban farmers, given the fact that they do not require planning, and one sells what one brings. However, bag deliveries, supermarkets and the organic market are very promising alternatives for farmers engaged in UPA on medium and large-sized plots, or who have UPA as their main source of income, and which require more organized farmers.

A.2.5 Resilience

Besides giving people jobs and new sources of livelihood, PAU provided important climate benefits. After heavy rainfall and forced evacuations in 2007, Rosario began to use the programme to build climate resilience. A RUAF study[52] further supported understanding of using UPA in reducing urban heat island effect, the use of food transport and using green infrastructure to reduce the impact of flooding. For instance, Rosario sourced food from more than 400 km away and a study of the main vegetables (potato, tomato, lettuce, onion, carrot and squash/pumpkin), which originate from various production locations, showed that if all the lettuce were produced in the Greater Rosario region instead of in distant production locations, reductions in fuel use and contaminant greenhouse gas emissions could be as high as 90%. An even larger reduction in the use of fossil fuel could be achieved if the remaining local transportation uses renewable energy sources, or if local transport is carried out, for example, by bicycle. If, in addition, food losses are reduced in the entire supply chain and if organic city waste is used for compost production and fertilization,

[52] CDKN Reports. RUAF Foundation. https://cdkn.org/project/monitoring-impacts-of-urban-and-peri-urban-agriculture-and-forestry-on-climate-change-adaptation-and-mitigation

total emissions related to production and consumption will be lowered even further. Based on this study, PAU started to build its resilience programme, and gradually expanded into Rosario's peri-urban areas, just outside of the city. To institutionalize this expansion, the municipality created the "Green Belt Project," a new land use ordinance in 2015 that permanently designated 800 hectares of peri-urban land to be used for agro-ecological fruit and vegetable production. The Rosario Municipality included new areas for peri-urban agriculture in their city development plan, and included a new land use category 'land used for primary production.' Localizing vegetable production created 95% fewer greenhouse gas emissions. Repurposing abandoned land for agriculture has improved the soil's ability to absorb water.

A.2.6 Lessons

Integrating UPA into the city's strategic plans, facilitated resilience planning, and ascertain reduction of carbon footprint, while generating jobs and social inclusion. Rosario shows that cities can be more sustainable and more productive for more residents through inclusive and empowering climate actions. These types of innovations are more important than ever as cities start to recover from the COVID-19 pandemic.

Across Rosario, 75 hectares of land are now dedicated to agro-ecological production and urban gardens, with another 800 hectares preserved for agriculture in the peri-urban area. Rosario's urban agriculture programme has allowed many men and women to improve their livelihoods. There are over 800 producers' groups/community gardens, of which over 25% actively involved in marketing. Six markets are held weekly in public spaces, every day, there is a market somewhere in the city. In addition, there is one producer-led agro-industrial facility in the city that processes vegetables and another that produces natural cosmetics using medicinal plants. Two others are under construction funded by participatory budgeting. Four garden-parks are constructed in the city.

A.2.7 Some success factors

(i) Long-term vision and integrating UPA in longer term planning

(ii) Financial sustainability of farmers and the PAU

(iii) Broad support: the program has received financial and capacity support from national actors and local NGOs as well as from international entities, including RUAF, International Development Research Centre, and UN Habitat.

(iv) Integrated approach and using UPA multi-functionality: agro-ecological practices allowed the program to rehabilitate and revitalize urban spaces, while providing employment opportunities for poor and marginalized families.

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Urban and Peri-Urban Agriculture for Strengthening Pro-Poor Resilience in Asian Cities:

Investment Needs and Opportunities

Urban and peri-urban agriculture (UPA) is increasingly being recognized as part of the solutions to urban food insecurity and building resilience of the urban poor in Asia and the Pacific to climate shocks and stresses through food supply, nutrition and livelihood/job creation. Based on the global experiences, this report builds a case for integrating UPA in urban development and planning in Asia and the Pacific, and sketches challenges of UPA scaling, and the responses to these challenges. It also explores possible financial and technical support by ADB, which may include a policy document on UPA, regional experience-sharing, and financial packages for UPA-related investments.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members —49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

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