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Africa's future: Demarginalizing urban agriculture in the era of climate change

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Abstract

Africans are migrating to cities. With the continent's cities projected to double in population by 2050, the issue of food insecurity in urban areas is increasingly becoming a major concern. To sustain this urban explosion, the question of how to maintain constant food supply to urban residents remains an urgent priority since these locations do not always get access to adequate food. There has, however, been little work on examining urban agriculture (UA) as an alternative means of reducing hunger in Africa, especially in the face of climate change. Some city authorities have argued that UA must be shifted to rural areas since they constitute a public health nuisance. The paper, however, is based on the hypothesis that food production in locations with high demands mitigates against climate change and addresses Africa's food insecurities by exploiting new avenues for cultivation. To this end, an extensive literature review was conducted, resulting in the identification of different degrees of opposition from policy-makers and urban authorities, who usually underrate the actual contribution and value of UA to urban food security. It is recommended that, considering the increasing recognition of urban farming, planners and policy makers must collectively design interventions to enhance urban food production.

Introduction

The objective of this paper is to address a burning issue: the contribution of urban agriculture (UA) to improving Africa's food security in the era of climate change. Africa is often seen as the world's fastest urbanising region with the percentage of urban residents estimated to rise from 11.3% in 2010 to 20.2% by 2050 (Saghir & Santoro, 2018). Yet, besides population explosion, the stability of the region's food systems may be threatened due to climate change (Serdeczny et al., 2017). The contribution of UA in improving the living conditions of Africa's urban dwellers has for decades either been ignored or, at best, seen as having merely a minor role to play in alleviating chronic hunger (Conceição et al., 2016; Tibesigwa & Visser, 2016). Undeniably, agriculture has been perceived as an activity deserving to be confined to rural areas (Padgham et al., 2015). What is more, UA has been seen to constitute a public health nuisance (Asomani-Boateng, 2002). To this end, urban residents who participate in self-grown food have been harassed or at least been unsupported, even in moments of food scarcity (Badami & Ramankutty, 2015).

Yet, in stark contrast to earlier debates and theoretical confusions on the relative significance of UA, substantial evidence now shows the various ways in which UA impacts on the regional, national and urban economies (Reynolds, 2015; du Toit et al., 2018). Consequently, the position of some planners and urban officials are slowly but steadily shifting, especially as the potential benefits of UA for environmental management and food security become better understood in policy circles (Lindley et al., 2018). It is, however, imperative to add that in the Af-

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rican context, UA is not an undifferentiated activity. The nature of UA and the challenges it poses tend to differ based on social contexts (Smart et al., 2015). The paper will, where applicable, highlight some of these differences and how they impact on urban farming without overlooking the general importance of UA.

Based on theoretical exposition, the paper's cardinal proposition is that UA (in)directly contributes to various aspects of the continent's urban economy, livelihood and food security. Even though scholars have provided various definitions of urban agriculture, the core concept at the heart of all these definitions is the recognition that it encompasses gardens and farms in inner city areas. While some urban residents are able to produce their own food, and thus, are able to reach food security, others find it expensive and difficult to access arable land to cultivate crops (Benis & Ferrão, 2017). Climate change, however, seems to threaten the food security situation of many urban farmers (Materechera, 2018). Climate change may be defined as changes in the pattern of weather, as well as other changes in the oceans and land surfaces (Chaudhury et al., 2013). Such changes may either be induced by the sun's radiation, changes in the composition of the atmosphere or land use (Girardet & Bree, 2009).

Also, with the continent's rapid urbanization, demand for fresh products will inevitably increase, especially as urban dwellers generally buy approximately 90% of their food through urban markets (Tumushabe, 2017). It was in this light that the Food and Agriculture Organisation (2007) mooted that inadequate food intake and malnutrition in the region can be halved if both adults and children carry out urban horticulture. To this end, UA can address one of the continent's most puzzling and underserved issues: resolving the food insecurity situation of the region's growing urban population (Smart et al., 2015). To efficiently unlock the potential of UA, suitable policies must be adopted to deal with the constraints that arise from farming in cities (Pribadi & Pauleit, 2015). Moreover, such policies must be backed by strong institutional capacity to ensure that the sector functions well at all levels of the continent's urban economies (Specht et al., 2016). To be exact, urban officials must adopt strategies to address negative ecological changes. Also, given that farm lands act as breeding grounds for diseases, including bilharzia and malaria, cities need to build or strengthen capacity to address changes in disease ecologies (Barthel et al., 2015).

The structure of the paper is as follows: subsequent to the introduction, the next section sets out a working definition of UA and provides its key features in the continent. The section further provides a conceptual framework for understanding the contribution of UA in Africa. The third section argues that, while UA is a useful avenue for addressing chronic hunger, its contribution is threatened by several factors at the local, national and regional levels. This part highlights the policy environment and institutional frameworks within which UA operates, and the lack of political will on the part of urban authorities to promote this practice. Section four examines two case studies that underscore some of the practical challenges faced by urban farmers. Section five serves as the conclusion. It sets out recommendations and policy options to better enhance immediate and long-term UA.

Urban Agriculture: what and why?

Over the last decades, efforts to achieve a universally acceptable definition of UA have not been entirely successful. Many scholars have, however, attempted to define this practice as any farming activity taking place on (peri)urban fringes, intra-urban areas of towns or built-up areas of cities (Barthel et al., 2015; Barthel & Isendahl, 2012). Others have, however, defined it as any agricultural practice on the fringes of or within a metropolis, city or town which raises or cultivates, processes, and distributes (non)food products (Moustier, 1999; Bryld, 2003). The variations in definitions demonstrate the intrinsic problems associated with the conceptualisation of urban space. The definitions specifically signify the diversity and peculiarity of UA and thus, the range of policies and actors affected by it.

While rigid conceptions which place extreme emphasis on rural-urban binaries or urban-peri-urban dualisms may be useful to some degree, they often overlook key interaction that make urban and rural spaces mutually constitutive and interdependent (Davis et al., 2017). To this end, just as the recognition of the diversity of UA is vital, so is the perception of UA as a dynamic concept. To enhance the capacity of UA in Africa, urban authorities and policy makers must understand that UA is not an isolated phenomenon, especially as the practice is diverse and inextricably linked with rural and (peri)urban activities (Barthel & Isendahl 2012).

Despite the fact that researchers have not been generally successful in framing a categorization that clearly captures the unique features of UA, classifications can be established by relying on a range of attributes, such as land tenure issues, sources of labour, kinds of crops, scale of cultivation, gender and motives of practitioners, and most importantly, the physical location of the activity (Byker et al., 2010). The decision to embark on UA is also determined by the market value of the goods produced, growth conditions of the crop, and resource availability (Hallsworth & Wong, 2015).

The choice of crop to be cultivated in cities is manly determined by whether it is being raised for market sale, or subsistence, or household consumption (Asrat & Simane, 2017). Whereas other food crops are produced in cities, some scholars argue that urban farmers favour a variety of vegetables in addition to herbs and fruits (Smart et al., 2015). For example, even though fruits and vegetables from UA are vital commodities of export in Lagos, many farmers in Ndola and Chingola in Zambia's Copperbelt province cultivate carrots, cabbage, and lettuce which have high demand by migrants (Akinmoladun & Adejumo, 2011; Smart et al., 2015).

UA is shaped by several variables at the city, national and regional levels. In order for UA to have both immediate and long terms impact on Africa's economies, urban authorities must establish the right policy framework to address several factors at the city level which (in)directly impact on UA. These include the specific terms of land tenure, the manner within which land is made available for agricultural purposes in urban areas, the extension service support for agriculture, and inadequate access to water and land (Sorensen et al., 2015). For instance, UA can be greatly stifled by overly restrictive land-use regulations, particularly those regulating unused urban spaces. Similarly, government policies on irrigation and water supply infrastructure development can affect the economic and physical access to water for urban farmers. To be exact, the pricing policies of national water will determine who has more access to water in cities. Ultimately, the urban poor will have a challenge in raising crops, particularly in the absence of natural aquifers due to neoliberal economic policies which advocate for market-oriented water management regimes (Wong & Ribero, 2013).

Like water, the connection between UA and land policies can (in)directly affect city food production (Smit, 2016). For instance, the quantity of self-grown food can be enhanced by polices that allow cultivation on unused state land or polices that seek to spare fertile urban landscapes from industrial development or urban sprawl. Also, UA practices can be influenced by economic ideology that shapes the macroeconomic policies of a country (Säumel et al., 2016). Besides providing property owners the ability to use their land as collateral for credit, policies guided by a neoliberal philosophy tend to enhance the land rights of private individuals since this property rights structure is perceived to contribute to more efficient use of land. Yet, urban farming can be undermined by titling (usually preferred by proponents of neoliberal economic policies), as they can dramatically increase the value of land, thereby making it more attractive for other enterprises (Materechera, 2018).
Similarly, based on their vision that shape their strategies and core values, non-governmental organisations (NGOs) may have a stake in urban food cultivation. While international NGOs may sometimes reflect the ideological bent of their donors, they can still help leverage resources and provide experience from other locations around the region and beyond to improve local UA (Hall et al., 2017). They can work directly with urban farmers by exploring (inter)national and local markets for farm produce, helping them to secure farm inputs and fertile lands. Ideally, local organisations are well placed to contribute to urban food security through land reform by advocating and lobbying national governments on these matters.

A key factor which can determine whether UA should be shifted to the countryside is the perception of municipal policy makers and planners on the appearance of an ideal city (Appeaning-Addo, 2010). The notion that urban areas are places for business and pleasure may lead to government aversion toward urban horticulture. Other reasons for opposition to UA differ, and they include social concerns, or concerns that crop fields may be used by criminals; administrative concerns, or the lack of provision in zoning laws; and public health concerns, or resident's exposure to pesticides and diseases (Amoah et al., 2007).

Besides the politics of city image, agricultural policies serve as an important tool for achieving desired economic objectives and improving individuals' standards of living. It is expected that subsidy allocation criteria can play a key role in reducing urban poverty (Cofie & Drechsel, 2007). This could be achieved through increased participation of the urban poor in UA as a means of diversifying or supplementing their livelihoods (Davis et al., 2017). Apart from serving as a means of attracting certain targeted groups of (poor) people, state subsidies for agricultural inputs will enhance the viability of UA and the kinds of crops which are cultivated.

Also, environmental and public health concerns may serve as constraints to UA. Public health acts set out the manner in which urban sites are to be utilised in order not to pose a threat to public health. Such stipulations may include, but not be limited to where and how farm produce is cultivated or sold, and whether livestock can be kept within homes (West, 2015). Equally, municipal and national by-laws on the environment may impact on the extent of waste recycling, the use of inorganic fertilizers, and quantity of urban land devoted to horticultural use.

As indicated in in the beginning of this paper, the contribution of UA to food security in Africa could be enormous, especially in a region with chronic hunger and

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widespread poverty. With the continent's urban population explosion and the adverse impact of climate change, an active participation of urban resident in food cultivation will have both immediate and long-term effect (Simatele & Simatele, 2015). Such effects include health and environment improvements, transmission of agricultural knowledge to subsequent generations, income generation, employment creation, food security, dietary and nutrition improvement.

Also, as rural-urban migration is contributing to a decrease in rural agricultural production due to loss of farm labour, it is expected that there will be a significant increase in urban household food demand. It is in light of this development that UA stands to play an essential role in meeting the overall national food self-sufficiency, while improving urban food and livelihood security (Prain & Lee-Smith, 2010). For instance, a disproportionate percentage of residents in Cape Town (South Africa) and Accra (Ghana) increasingly rely on crops cultivated in public spaces for income and food. Income obtained through self-grown food can be used to purchase vegetables, fruits, fish and other food items as a means of complimenting household diets (Nyantakyi-Frimpong et al., 2016). This implies that through increased availability of household incomes, self-grown food contributes to food diversification.

Moreover, given that African cities continue to witness an increase in the number of residents with HIV/AIDS, UA can play an important role in enhancing the nutritional needs of households plagued by this pandemic. With such families often being food insecure, self-grown food can contribute towards reduction of the spread of the disease while enhancing adherence to its treatment (Dyer et al., 2015). UA simply makes it more affordable for such vulnerable households to access food since food cultivated in, around and within urban areas significantly cuts the cost of transportation often leading to reduced prices of food in the local market (Webb, 2011). Further, by supplementing food cultivated in rural areas, self-grown food can stabilise the prices of food on the market. Urban food production can, in addition, prevent a country's excessive foreign exchange loss by reducing its dependence on food imports (Zimmerer et al., 2015). During times when cultivation in rural parts is unpredictably low (due to conflict, transport problems, heavy or poor rain), UA can be a vital tool in cushioning market supplies or high prices, especially as African countries basically depend on crops cultivated in the hinterlands to feed their national population (Meijer et al., 2015).

It must be noted that UA is increasingly becoming an important source of job creation, especially in the absence of formal employment in many African countries (Arku et al., 2012). Self-grown food act as an important means of income generation particularly in the wake of weak manufacturing and industrial sectors. Thus, considering the contradiction between the unavailability of employment opportunities and the mounting urban populations in the continent, UA is specifically an essential source of employment for individuals with low skill levels, and thus, may not successfully compete for formal sector employment (Powlson et al., 2016). Reducing unemployment and increasing labour are key to achieving Sustainable Development Goals, to be exact, that of forestalling poverty and hunger (Goals # 1 and 2). It is, however, instructive to add that farming in cities is not strictly an activity for the poor, but of the affluent as well (Asomani-Boateng, 2002). Besides engaging in large scale UA for profit making, the better-off groups engage in self-food production in order to diversify or supplement their diets. For example, while horticulture is widespread across all income groups in Johannesburg, Webb (2011) found that the rich had larger farm sizes which produce for the market. Further, while different social groups (including the youth) in sub-Saharan Africa engage in UA, the better-off were more inclined towards market-oriented food production (Prain & Lee-Smith, 2010). The paper now turns its attention to focus on some of the major constraints which hinder urban residents from fully unlocking the potential of UA.

Everyone eats: Understanding challenges facing urban agriculture

Generally, the use of lands in Africa's cities is determined by official responses to the barriers erected by unrestrained urban growth, especially in the area of increasing urban population and the spatial extent of the city (Asrat & Simane, 2017). Unlike urban growth in Western countries which is accompanied by improved infrastructure, Africa's urbanisation is expanding without a proportionate socio-economic transformation such as adequate transport system, greater housing supply, expanding services and job creation (Dossa et al., 2015). The average poverty rate for Africa stands at approximately 41%, with a large percentage of urban residents living with limited access to adequate housing, employment, sanitation and clean water (World Bank, 2018). Against this backdrop, urban authorities pay less attention to issues concerning food production as compared to the more visible aspects of urban life such as infrastructure, housing, education and health issues (Lwasa et al., 2015). While the contribution of self-grown food cannot be underestimated, it is still perceived by some authorities as unsuitable for the Africa's urban land use (Meijer et al., 2015). To this end, policies regulating urban devel-

opment and land use planning have over the years continuously overlooked the prospect of UA as an efficient means of ensuring urban food security and sufficiency (Dossa et al., 2015). This constraint is exacerbated by the conversion of agricultural lands in (peri)urban areas into industrial sites, the scale of urban sprawl, and the pattern of urban growth and urbanisation (Pribadi & Pauleit, 2015).

Without a clear policy direction, attitudes of officials towards crop cultivation in (peri) urban area range from illegality and in some cases, tolerance with legislative support (Akinmoladun & Adejumo, 2011). For instance, while it is excluded from Kenya's urban land use system, UA has received considerable legal backing in Zambia, Ethiopia and South Africa (Ogato et al., 2017). Yet, in other cities such as Bulawayo and Harare, UA is generally excluded from official urban planning polices and thus, there is no legislative instrument backing it (Barthel et al., 2015). Nonetheless, starting from 2002, urban officials from these cities have begun extending considerable leverage to urban farmers on condition that such activity must be practiced in a systematic or well-structured manner (Barthel & Isendahl, 2012). Consequently, UA is only interrupted when there is an outbreak of disease, or the land in question is required for eminent domain or development project (Cofie & Drechsel, 2007). A further hindrance to UA is that in most African countries, this practice often lacks adequate infrastructural and institutional support. To be exact, urban authorities tend to tailor their state-sponsored horticulture support services and development policies mainly towards the agriculture sector in rural areas, further reflecting the general lack of political will for this activity (Dossa, 2015). Also, key reasons for yield or harvest losses are diseases, pests and extreme weather conditions including storms or droughts. The Intergovernmental Panel on Climate Change (2018) has projected that by 2050 extreme weather conditions will exacerbate due to climate change. Clarke (2018) has projected that a rise of 2°C of the global temperature by 2100 will drastically destabilise the continent's food cultivation systems. Because urban surroundings are usually about 2° to 3 °C warmer, cities can typically provide more favourable conditions than rural areas in temperate conditions. This prolongs the growing, thereby enhancing the overall output and makes an integration of crop cultivation in cities more attractive (Du Toit, et al., 2018).

Nonetheless, through the use of pesticides, organic and chemical fertilizers, UA is known to pollute the environment (Reid & McKenzie, 2016). This, notwithstanding, UA is a means of protecting and promoting biodiversity in African cities. Urban indoor farms or the production of vegetables and other plants in containers, aquaponic and hydroponic systems does not only prevent the leakage of pesticides and fertilizers into the environment but forestalls crop contamination (Reynolds, 2015). Equally, urban environments are generally highly polluted by transport, domestic activities and industry (Reid & McKenzie, 2016). To this end, it can be argued that self-grown food in cities can typically mitigate climate change in terms of carbon emissions triggered by food packaging, cooling, and storage. Although it is estimated that food production contributes to about 20-30% of the global greenhouse gas emission, indoor faming systems can mitigate climate change as these systems work energy efficiently and thus, have less greenhouse gas emission (Parry, et al., 2004). Further, indoor farming systems can forestall crop cultivation from being exposed to extreme weather due to climate change or pollution. This system of farming could have a broader impact of mitigating climate change only if it is implemented on a larger scale (Powlson et al., 2016). Yet, due to policy restraints and high costs, this is not very likely to be adopted in the coming decades.

Similarly, food cultivated in cities cut down on pollution as they often do not have as many 'food miles' as compared to their rurally cultivated crops (Ogato et al., 2017). Through the reduction in energy consumption, the reuse of organic wastes and recycling, UA plays a vital role in lessening the ecological footprints of cities, creating a more natural environment and making cities greener. With urban horticulture, the food produced would be fresher with an extended shelf life since they could reach the market within hours after harvesting. Likewise, the environmental pollution through carbon dioxide emission would be significantly reduce, with a considerable drop in storage and logistical costs (Barthel et al., 2015). An important question in discussion on UA is the physical carrying capacity of the city space to support horticulture. Being the two most essentials of crop cultivation, water and land have primary importance especially in the context of mounting pressure from rapid urbanisation in many African cities (Benis & Ferrão, 2017). Attempts to promote the capacity of crop cultivation in the continent's urban areas need an in-depth understanding of the social relations governing access to water and land by urban residents.

One major challenge worth citing is Africa's contemporary land tenure system. As a means by which land is owned or held, land tenure forms can be grouped into five main categories: (i) non-formal tenure land ownership such as squatting, unauthorised and (un)regularised

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sub-divisions; (ii) religious land including land outside of commercial use; (iii) public tenure or land vested in the state; (iv) private tenure or land governed by individual rights; and (v) customary tenure which encompasses land held by traditional rulers and allocated based on one's need instead of ability to pay (Badami & Ramankutty, 2015). Considering the low profile of UA in Africa's planning agenda and policies, the formal acquisition of city lands for horticultural purposes typically remains a challenge. Besides few urban areas such as Cape Town and Ethiopia's Mekelle where city officials have adopted policies in support of UA, most urban crop cultivation in the continent occur either on backyards, patios or informally occupied public land (Webb, 2011; Asrat & Simane, 2017). Others raise their crops on lands owned by private entities, including individual lease holders or commercial farms, and lands owned by the government. Generally, the farmers have specific use rights which spans over a certain duration, within which they act as tenants (Ogato et al., 2017). Due to the risk associated with reclaiming of land from borrowers, land owners in some instances are unwilling to grant usufruct rights to third parties as caretakers. Since a disproportionate percentage of UA is carried out on informally occupied lands, farmers under this tenure arrangement are confronted with challenges ranging from eviction, violence from the state, crop destruction and land repossession. There has, for instances been incident of crop slashing in Lagos and Ambo Town, Ethiopia (Akinmoladun & Adejumo, 2011; Ogato et al., 2017).

Moreover, a key impediment to urban gardening is inadequate access to low-cost water. Urban farmers generally rely on piped water for agriculture. With Africa's urban water supply infrastructure under pressure, coupled with the domestic water shortages, watering crops in home backyards and patios is not only ethically questionable but expensive (Akinmoladun & Adejumo, 2011). To this end, large scale farmers operating in either (peri) urban areas, state-owned land or in cities often rely on natural water sources such as flood plains, streams, and springs for irrigation (Cofie & Drechsel, 2007). Over-reliance on these sources tend to trigger tensions among farmers for control of access, especially with climate change gradually contributing to variable rainfall and drainage flows. Additionally, UA tends to be watered using polluted water sources. Residents in most African cities typically deposit refuse in streams and rivers, since most of the cites have poor sewage facilities (Barthel & Isendahl, 2012). While the most common water pollutant is by far biological contamination from bacteria and faecal matter, there has been high traces of heavy metals including lead (Pb) found in water sources used for irrigation in cities such as Kumasi and Nairobi (Sorensen et al., 2015). Irrigating vegetables with such water poses serious threat to public health in the region.

Furthermore, as populations continue to expand in cities, the issue of water scarcity becomes an important agenda for national and local governments. Urban authorities have a primary role to play in easing the physical and economic scarcity of water in cities, particularly those located in (semi)arid regions as they face the most threat (Amoah et al., 2007). Such measures must be adopted in ways that enhance UA. Strategies which can be adopted to supplement existing urban water sources include low-cost irrigation technologies, treadle pumps and canals. These manageable and small-scale irrigation technologies cannot only be adopted by the urban poor but can boost the productivity of UA (Cofie & Drechsel, 2007). This effort calls for changes in the attitudes of national and local institutions towards urban horticulture. Such transformation will not only promote the notion that UA deserves fiscal attention, given that it is an integral aspect of urban environment, but enhance its legitimacy. This institutional reform will further ensure that in contrast to other uses (including recreation and industrial production), UA is given priority for water allocation (Sorensen et al., 2015). Ultimately, urban authorities must endeavour to institutionalise mechanisms to enhance recycling and water treatment in urban centres.

Eatable cities: Case studies

The objective of this section is to assess data which exist in the area of UA. Two case studies of UA in Mzuzu and Accra are explored to exemplify the arguments or issues presented above. In both urban regions, urban population growth has been high over the years. These cities symbolise relatively different geographical regions of the continent (Southern as opposed to Western Africa), varied institutional capacity, dissimilar socioeconomic characteristics, different internal dynamics, and two separate scenarios of divergent urban growth of urban areas in the continent. With an estimated population of 271,400, Mzuzu is the third largest city in Malawi and is confronted with various development pressures (WFP, 2018a). As a coastal city, Accra, on the other hand, has a population of about 2.27 million residents and is connected to the international market (WFP, 2018b).

Case study 1: UA in Mzuzu

Data: the information used in this case study is drawn from Arku et al's (2011) survey with Mzuzu's urban officials.

Figure 1: Urban farmers display the produce of their fruit and vegetable garden in the middle of Mzuzu, Malawi (Photo credit: Author)

Introduction: UA in Mzuzu.

Mzuzu emerged around the Commonwealth Development Corporation's Tung Oil Estate in 1947 and received its city status in 1985 (Mtika, 2016). It is a political and economic hub, covering an estimated area of 76 km^2 (WFP, 2018a). Relative to Lilongwe and other cities in Malawi, Mzuzu is small and new in terms of population size and urban density. With an official population of 130,000 in the city and 1.7million in its outskirts, the city's residents rely on crops cultivated from far-off central region districts, including Ntcheu and other neighbouring northern districts (WFP, 2018a). As shown in Figure (1), food from these parts include Irish potatoes, cassava, beans and maize. Yet, as a means of serving its ever-growing population, Mzuzu is increasingly dependent on commodities produced in its vicinity or within the city, specifically in backyards or zones spaces (Arku et al., 2011). Most common locations on the fringes of Mzuzu for UA are Malivenji, Chigwere, Kaboko, Dunduzu, and Choma (Mtika, 2016). Common products (such as maize, vegetables, milk and chicken) obtained through this form of farming are used to satisfy the food needs of dairy companies, hospitals, education institutions and small businesses (Arku et al., 2011).

Green cities: institutional reaction to UA in Mzuzu

In terms of increasing farming activities in Mzuzu, there is an obvious contradiction between the responses of the city assembly and the officially stated land zoning code. Official policies proscribe the use of lands in the city for purposes other than those set out in the zoning codes. Technically, all farming in the urban area is illegal, since the urban infrastructure plan stipulates the use of urban land for commercial, industrial and residential purposes, but excluding agricultural purposes (Arku et al., 2011). Yet, the city's officials have not rigidly implemented these policies. For while, they have become increasingly aware of agricultural practices in the city, and/or tenants overtly engaging in farming activities such as backyard farming or livestock, urban officials do not take action or at best, have been reluctant to impose sanctions. A striking illustration of the quest for urban authorities to accommodate UA is demonstrated by a cattle herder who overtly feeds his livestock off the grass on the sides of the small airstrip of the city (Arku et al., 2011). Hence, irrespective of the safety concerns triggered by this activity, the official position of the city has not been invoked to halt farming activity in Mzuzu.

Nonetheless, in light of the growing presence of UA within the urban area, authorities who double as city residents have decided to amend some policies to better enhance the practice of farming in the city (Arku et al., 2011). This decision is also not only influenced by the threat that poorly managed UA can pose, but the realisation of the key role of UA to improve the living conditions of the people they seek to govern. Yet, budgetary constraints have hindered attempts by city officials to conduct in-depth research into the overall importance, actors, extent, exact nature and the necessary intervention needed for agriculture in the city. Financial setbacks

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Figure 2: An urban farmer tends his backyard garden in Accra, Ghana (Photo credit: Author)

have in addition undermined the prospects of urban authorities to develop alternative consultation channels with residents on essential planning and policy issues. To address these shortcomings, there was an ongoing discussion for the city to allocate a large track of land near Lunyangwa agriculture research station for horticulture. In sum, key issues which deserve some attention in Malawi are the: (i) lack of proper official understanding of the actors involved in UA; (ii) true potential of urban farming in improving urban food security; (iii) financial challenges which hinders attempts to promote and regulate UA; (iv) lack of avenues for involving key stakeholders in the planning and decision making of the city; and (v) zoning codes proscribing UA.

Case study II: UA in Accra

Data: The data used is drawn from Asomani-Boateng's (2002) survey of 87 (peri)urban horticulturalists and Arku et al's (2012) survey of 127 vegetable cultivators. These surveys interrogated the views of urban cultivators on issues relating to the constraints faced by farmers, contributions of UA, the attitudes of urban officials towards UA, and types of crops being produced. The paper now turns to provide a summary of these findings.

Introduction: challenges and prospects for UA in Accra.
Accra, akin to many developed urban areas in sub-Saharan Africa, has witnessed a slow but steady growth in population. In 1950, the city's population was estimated to be 177,147. Between 2015 to 2018, Accra has experienced an annual growth rate of 2.14% (WPR, 2018). It is projected that by 2030, the city's population will reach approximately 5 million (WPR, 2018). Also, between 2000 and 2014, a total of 29,609 square kilometres of built-up area was added to the Accra urban extent (WFP, 2018a). This physical expansion and population explosion present both challenges and prospects for UA in the country's capital. Besides the need for fresh food stuffs, the population increase has heightened the need for adequate food supply. Consequently, the opportunity to acquire food or raise crops in the urban area has become an essential aspect of the livelihood strategies of residents. Yet, the population and the city's physical expansion is placing undue pressure on the arable land available for crop cultivation (Nyantakyi-Frimpong, et al., 2016).

Feeding the City: Crop cultivation in Accra
UA in Accra dates to 1897 when the British colonised the Gold Coast. From the time onwards, the practice has become widespread. As the city's population expands, so does the figure of individuals involve in the activity (Asomani-Boateng, 2002). Empirical surveys have demonstrated that two types of faming are practiced, open and backyard (or enclosed) cultivation. According to Nyantakyi-Frimpong et al. (2016), approximately 50% of urban households engage in this activity.

Often practised by rural migrants and indigenous people, open-space farming is practised round the urban centre by people of lower socio-economic status (Obosu-Mensah, 2002). To be exact, open-space farming primarily occurs on public or unused community lands as shown in Figure (2). There are several types of arrangements for the use of urban lands, and even though some farmers pay a fee for the use of the lots, no farmer owns the land (Arku et al., 2012). In stark contrast to open cultivation, enclosed cultivation is practiced on building lots that may or may not be walled. It is mainly for house-

hold consumption. Residents who engage in this type of cultivation are generally caretakers of such plots or are landowners as enclosed cultivation takes place on private lands (Asomani-Boateng, 2002). Due to inadequate lots in the city centre, most enclosed cultivation in the city takes place in the suburbs.

Like their enclosed space counterparts, open space farmers depend on hand dug wells and pipe-borne water for irrigation (Obosu-Mensah, 2002). Typically, most open space farms are located close to rivers and streams due to the amount of water required for vegetable cultivation (Amoah et al., 2007). Although the cultivation of crops highly depends on the availability of water and the location of the land, the most commonly cultivated crops are leguminous crops, root crops, cereal, fruits and maize. Other commonly known vegetables cultivated are spinach, kontomire, lettuce, cucumber, green pepper, spring onions, carrots and cabbage (Nyantakyi-Frimpong, et al., 2016). Other aspects of UA in the city range from rearing of short-cycle species such as greater can rat, mushrooms, aquaculture, dairy farming, small ruminants and poultry.

Scale of Accra's UA

The full extent of land used in Accra for UA is difficult to determine. This is because agricultural cultivation in the city is mainly informal in nature, taking place outside the official city planning agenda. Yet, estimates from Asomani-Boateng (2002) suggests that plot sizes for UA range between 0.01-0.02 ha per farmer. The survey further illustrates that approximately 1,000 farmers were engaged in irrigated and rain-fed UA to produce more traditional vegetables, including hot peppers, eggplant, okro, tomatoes and other exotic vegetables, such as cauliflower. Results from the survey suggests that in the dry season, irrigated vegetable production occurs on a 100-ha area. The same survey further suggests that approximately 251 ha of urban land are under mixed cereal-vegetable, 47 ha under vegetables and 680 ha under maize cultivation systems. Considering that recent statistics show irregular growth on major local crops, urban authorities must adopt steps to promote Accra's UA.

Growing food growing cities: Role of UA in Accra

In light of the global climate change phenomenon, UA can help address future food insecurity issues in Accra. Due to the swelling population, it is expected that the present high demand for perishable products will increase in the future. Also, if properly managed, the practice of urban cultivation could enhance households' access to food, especially as approximately 90% of all food consumed in the city is purchased from the market (Nyantakyi-Frimpong, et al., 2016).

Capacity challenges facing UA in Accra

The practice of crop cultivation in Accra falls within the domain of different types and levels of government. Even though there is no specific legislation which provides for UA, the Ghana Decentralisation Policy, Modernisation of the Capital City and Poverty Reduction Strategy highlights small-holder agriculture development (Nyantakyi-Frimpong, et al., 2016). Yet, if the potential of UA to food and nutrition security is to be fully realised, then the following key issues which have been highlighted by the various surveys deserve serious consideration. These include the integration of UA into the course structure of educational institutions; government intervention in post-harvest handling and marketing; promotion of UA micro-enterprises; education and public awareness of urban food security and UA; land rights of farmers, such as temporary access to land; legislative and policy support for UA; and inclusion of UA into city plans.

Conclusion

The major contribution of the paper is to contribute to the scientific debate on UA. To enhance Africa's urban food insecurity, the paper reviewed the state of self-grown food on the continent. To this end, several issues at the city and national levels which challenge this practice were identified and discussed. To exemplify the arguments provided and reflect on the different dynamics of pressures exerted on UA by urban development, two case studies were drawn from two countries. The general observation of the paper is that if properly managed, UA can make an enormous contribution in Africa's quest for dietary diversity, improve the nutritional need of urban resident, and improve food security, including food availability. Along with a host of other environmental gains, other key contributions stretch from income generation for millions of urban poor, employment creation and other major contributions to the economies of African countries.

Undoubtedly, in light of the chronic hunger and malnutrition confronting millions of urban residents in the continent, it is imperative that an alternative source of food production is explored to complement existing food supply. In order to depend on UA as a supplementary source, urban authorities need to pay attention to issues which are too often ignored and yet impinge on this farming system. Based on the two case studies, and from the general discussions in the paper, the following issues are noteworthy. In order for UA to serve as

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an important player in addressing the continent's food and nutritional needs, African city governments must: (i) identify and reformulate certain aspects of municipal statutes which hinder UA; (ii) support affordable urban land tenure reforms or long-term leases for vulnerable urban populations; (iii) develop technologies which enhance safe water recycling for UA use; (iv) enable urban farmers to access national subsidized agriculture and extension programs available to their rural counterparts; (v) develop mechanisms to ensure fair and adequate representation of all stakeholders and residents on UA planning issues; (vi) mobilise research capacity in order to establish the merits of UA; (vii) address systematic prejudices against UA through education programs or awareness creation; and (viii) develop a city-wide vision or policy environment which supports UA.

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Conflict of Interests

The author hereby declares that there are no conflicts of interest.

References

Akinmoladun, O. I., & Adejumo, O.T. (2011). Urban agriculture in metropolitan Lagos: An inventory of potential land and water resources. *Journal of Geography and Regional Planning*, 4(1), 9-19. doi: 10.5897/JGRP.

Amoah, P., Drechsel, P., Abaidoo, R.C., & Henseler, M. (2007). Irrigated urban vegetable production in Ghana: Microbiological contamination in farms and markets and associated consumer risk groups. *Journal of Water and Health,* 5(3), 455-466. doi.org/10.2166/wh.2007.041.

Appeaning-Addo, K., (2010). Urban and peri-urban agriculture in developing countries studies using remote sensing and in situ methods. *Remote Sensing* 2(2), 497-513. doi:10.3390/rs2020497.

Arku, G., Mkandawire, P., Aguda, N., & Kuuire, V. (2012). Africa's quest for food security: what is the role of urban agriculture? *The African Capacity Building Foundation*, 19, 1-34.

Asomani-Boateng, R. (2002). Urban cultivation in Accra: An examination of the nature, practices, problems, potentials and urban planning implications. *Habitat International*, 26(4), 591-607.

Asrat, P., & Simane, B. (2017). Adaptation benefits of climate-smart agricultural practices in the Blue Nile Basin: empirical evidence from North-West Ethiopia. In W. Leal Filho, S. Belay, J. Kalangu, W. Means, P. Munishi, & K. Musiyiwa (Eds.), *Climate change adaptation in Africa: fostering resilience and capacity to adapt* (pp. 45-59): London: Springer.

Badami, M.G., & Ramankutty, N. (2015). Urban agriculture and food security: A critique based on an assessment of urban land constraints. *Global Food Security*, 4, 8-15. doi.org/10.1016/j.gfs.2014.10.003.

Barthel, S. & Isendahl, C. (2012). Urban gardens, agriculture, and water management: Sources of resilience for long-term food security in cities. *Ecological Economics*. doi:10.1016/j.ecolecon.2012.06.018

Barthel, S., Parker, J., & Ernstson, H. (2015). Food and green space in cities: A resilience lens on gardens and urban environmental movements. *Urban studies*, 1–18. doi: 10.1177/0042098012472744.

Benis, K. & Ferrão, P. (2017). Potential mitigation of the environmental impacts of food systems through urban and peri-urban agriculture (UPA)–A life cycle assessment approach. *Journal of Cleaner Production*, 140 (2), 784-795. doi.org/10.1016/j.jclepro.2016.05.176.

Byker, C., Rose, N. & Serrano, E. (2010). The benefits, strategies and challenges of adults following a local food diet. *Journal of Agriculture, Food Systems and Community Development.* 1(1), 125-138

Chaudhury, M., Vervoort, J., Kristjanson, P., Ericksen, P., & Ainslie, A. (2013). Participatory scenarios as a tool to link science and policy on food security under climate change in East Africa. *Regional Environmental Change*, 13(2), 389-398. doi:10.1007/s10113-012-0350-1

Clarke, C. (2018) 'Climate change and food security: *Africa and the Caribbean' International Development Planning Review,* 40(2), 223-225.

Cofie, O., & Drechsel, P. (2007). Water for food in the cities: The growing paradigm of irrigated (peri)-urban agriculture and its struggle in sub-Sahara Africa. *African Water Journal* 1 (1), 22-32.

Conceição, P., Levine, S., Lipton, M., & Warren-Rodríguez, A. (2016). Toward a food secure future: Ensuring food security for sustainable human development in Sub-Saharan Africa. *Food Policy,* 60, 1-9. doi.org/10.1016/j.foodpol.2016.02.003.

Davis, B., Di Giuseppe, S., & Zezza, A. (2017). Are African households (not) leaving agriculture? Patterns of households' income sources in rural Sub-Saharan Africa. *Food Policy*, 67, 153-174. doi.org/10.1016/j.foodpol.2016.09.018.

Dossa, L.H., Sangaré, M., Buerkert, A., & Schlecht, E. (2015). Production objectives and breeding practices of urban goat and sheep keepers in West Africa: regional analysis and implications for the development of supportive breeding programs. *SpringerPlus*, 4, 1-12. doi 10.1186/s40064-015-1075-7.

Du Toit, M.J., Cilliers, S.S., Dallimer, M., & Goddard, M. (2018). Urban green infrastructure and ecosystem services in sub-Saharan Africa. *Landscape and Urban Planning,* 180, 249-261. doi.org/10.1016/j.landurbplan.2018.06.001.

Dyer, M., Mills, R., Conradie, B., & Piesse, J. (2015). Harvest of Hope: The contribution of peri-urban agriculture in South African townships. *Agrekon*, 54(4), 73-86.

Food and Agriculture Organisation. (2007). T*he urban producer's resource book: A practical guide for working with Low Income Urban and peri-urban Producers Organizations*. FAO, Rome.

Girardet, H., & Bree, A. (2009). Cultivating the Future: Food in the Age of Climate Change. Hamburg: World Future Council. Retrieved from *http://www. worldfuturecouncil.org/fileadmin/user_upload/PDF/ cultivating_the_future.pdf*

Hall, R., Scoones, I., & Tsikata, D. (2017). Plantations, outgrowers and commercial farming in Africa: agricultural commercialisation and implications for agrarian change. *The Journal of Peasant Studies*, 44(3), 515-537. doi.org/10.1080/03066150.2016.1263187.

Hallsworth, A. & Wong, A. (2015). Urban gardening realities: a case study of Portsmouth, England. *International Journal on Food Systems Dynamics,* 6, 1-11.

Intergovernmental Panel on Climate Change. (2018). The Regional Impacts of Climate Change. Retrieved from *http://www.ipcc.ch/ipccr eport s/sres/regio nal/index.php?idp=11*.

Lindley, S., Pauleit, S., Yeshitela, K., Cilliers, S., & Shackleton, C. (2018). Rethinking urban green infrastructure and ecosystem services from the perspective of sub-Saharan African cities. *Landscape and Urban Planning,* 180, 328-338. doi.org/10.1016/j.landurbplan.2018.08.016.

Lwasa, S., Mugagga, F., Wahab, B., & Simon, D. (2015). A meta-analysis of urban and peri-urban agriculture and forestry in mediating climate change. *Current Opinion in Environmental Sustainability,*13, 68-73.

Materechera, S.A. (2018). Soil properties and subsoil constraints of urban and peri-urban agriculture within Mahikeng city in the North West Province (South Africa). *Journal of Soils and Sediments*, 18(2). 494–505. doi 10.1007/s11368-016-1569-0.

Meijer, S.S., Catacutan, D., & Ajayi, O.C. (2015). The role of knowledge, attitudes and perceptions in the uptake of agricultural and agroforestry innovations among smallholder farmers in sub-Saharan Africa. *Journal of Agricultural Sustainability,* 13(1), 40-54.

Mougeot, LJ.A. (2000). Urban agriculture: definition, presence and potentials and risks. *Cities Feeding People Series*, 31, La Habana: Cuba.

Mtika, C. (2016). Mzuzu: Malawi's nascent city. Retrieved from *https://www.africanindy.com/southern-africa/mzuzu-malawis-nascent-city-5062095*.

Nyantakyi-Frimpong, H., Arku, G., & Inkoom, D.K.B. (2016). Urban agriculture and political ecology of health in municipal Ashaiman, Ghana. *Geoforum*, 72, 38-48.

Ogato, G,S., Amare, K.A., & Geneletti, B.D. (2017). Towards mainstreaming climate change adaptation into urban land use planning and management: the case of Ambo Town, Ethiopia. In W. Leal Filho, S. Belay, J. Kalangu, W. Means, P. Munishi, & K. Musiyiwa (Eds.), *Climate change adaptation in Africa: fostering resilience and capacity to adapt* (pp. 61-85): London: Springer.

Padgham, J., Jabbour, J., & Dietrich, K. (2015). Managing change and building resilience: A multi-stressor analysis of urban and peri-urban agriculture in Africa and Asia. *Urban Climate*, 12, 183-204. https://doi.org/10.1016/j.uclim.2015.04.003.

Parry, M.L., Rosenzweig, C., Iglesias, A., Livermore, M., & Fischer, G. (2004). Effects of climate change on global food production under SRES emissions and socio-economic scenarios. *Global Environmental Change,* 14 (1),

ISSN-Internet 2197-411x OLCL 862804632

53-67. doi.org/10.1016/j.gloenvcha.2003.10.008.

Powlson, D.S., Stirling, C.M., Thierfelder, C., White, R.P., & Jat, M.L. (2016). Does conservation agriculture deliver climate change mitigation through soil carbon sequestration in tropical agro-ecosystems? *Agriculture, Ecosystems & Environment*, 220, 15, 164-174. doi.org/10.1016/j.agee.2016.01.005.

Prain, G., & Lee-Smith, D. (2010). Urban agriculture in Africa: what has been learned? *African Urban Harvest*, 13-35.

Pribadi, D.O., & Pauleit, S. (2015). The dynamics of peri-urban agriculture during rapid urbanization of Jabodetabek Metropolitan Area. *Land Use Policy*, 48, 13-24. doi.org/10.1016/j.landusepol.2015.05.009.

Reid, M.C., & McKenzie, F.E. (2016). The contribution of agricultural insecticide uses to increasing insecticide resistance in African malaria vectors. *Malaria Journal,* 15, 1-8. doi.org/10.1186/s12936-016-1162-4.

Reynolds, K. (2015). Disparity Despite Diversity: Social Injustice in New York City's Urban Agriculture System. *Antipode*, 47 (1), 240-259. doi.org/10.1111/anti.12098.

Saghir, J. & Santoro, J. (2018). Urbanization in Sub-Saharan Africa: meeting challenges by bridging stakeholders. Centre for Strategic and International Studies, *https://csis-prod.s3.amazonaws.com/s3fs-public/publication/180411_Saghir_UrbanizationAfrica_Web.pdf 1-7.*

Säumel, I., Weber, F., & Kowarik, I. (2016). Toward livable and healthy urban streets: roadside vegetation provides ecosystem services where people live and move. *Environmental Science & Policy,* 62, 24-33. doi.org/10.1016/j.envsci.2015.11.012.

Serdeczny, O., Adams, S., Baarsch, F., Coumou, D., Robinson, A., Hare, W., Schaeffer, M., Perrette, M., & Reinhardt, J. (2017). Climate change impacts in Sub-Saharan Africa: from physical changes to their social repercussions. *Regional Environmental Change*, 17(6), 1585–1600. doi.org/10.1007/s10113-015-0910-2.

Simatele, D., & Simatele, M. (2015). Climate variability and urban food security in sub-Saharan Africa: lessons from Zambia using an asset-based adaptation framework *South African Geographical Journal*, 243-263. doi.org/10.1080/03736245.2014.924873.

Smart, J., Nel, E., & Binns, T. (2015). Economic crisis and food security in Africa: Exploring the significance of urban agriculture in Zambia's Copperbelt province. *Geoforum*, 65, 37-45. doi.org/10.1016/j.geoforum.2015.07.009.

Smart, J., Nel, E., & Binns, T. (2015). Economic crisis and food security in Africa: Exploring the significance of urban agriculture in Zambia's Copperbelt province. *Geoforum*, 65, 37-45. doi.org/10.1016/j.geoforum.2015.07.009.

Smit, W. (2016). Urban governance and urban food systems in Africa: Examining the linkages. *Cities*, 58, 80-86. doi.org/10.1016/j.cities.2016.05.001.

Sorensen, J.P.R, Lapworth, D.J., Nkhuwa, D.C.W., Stuart, M.E., Gooddy, D.C., Bell, R.A., Chirwa, M., Kabika, J., Liemisa, M., Chibesa, M. & Pedleyd, S. (2015). Emerging contaminants in urban groundwater sources in Africa. *Water Research*, 72, doi.org/10.1016/j.watres.2014.08.002 51-63.

Specht, K., Weith, T., Swoboda, K., & Siebert, R. (2016). Socially acceptable urban agriculture businesses. *Agronomy for Sustainable Development,* 36, 17. DOI 10.1007/s13593-016-0355-0.

Tibesigwa, B., & Visser, M. (2016). Assessing gender inequality in food security among small-holder farm households in urban and rural South Africa. *World Development*, 88, 33-49. doi.org/10.1016/j.worlddev.2016.07.008.

Tumushabe, J.T. (2017). Climate change, food security and sustainable development in Africa. In S.O. Oloruntoba, & T Falola (Eds.), *The Palgrave Handbook of African politics governance and development* (pp. 853-68): New York: Palgrave Macmillan.

Webb, N.L. (2011). When is enough, enough? Advocacy, evidence and criticism in the field of urban agriculture in South Africa. *Development Southern Africa*, 28(2), 195-208.

Webb, N.L. 'When is enough, enough? Advocacy, evidence and criticism in the field of urban agriculture in South Africa' (2011) 28(2) *Development Southern Africa* 195-208.

West, J. (2015). Can linking small- and large-scale farmers enhance adaptive capacity? Evidence from Tanzania's Southern Agricultural Growth Corridor. In T.H. Inderberg, S. Eriksen, K. O'Brien, L. Sygna (Eds.), *Climate change adaptation and development transforming paradigms and practices* (pp. 139-60): London: Rout-

ledge.

WFP (World Population Review, 2018b). Accra Population *2018.Retrieved from http://worldpopulationreview.com/world-cities/accra-population/*.

WFP (World Population Review, 2018a). Population of Cities in Malawi 2018. Retrieved from *http://worldpopulationreview.com/countries/malawi-population/cities/*.

Wong, A. & Ribero, C. (2013). New Agriculture: an alternative means to provide enduring employment and food security for Martinique. Etudes Caribeénnes, No. 26, Article 6710. Retrieved from *http:// etudescaribeennes.revues.org/6710*

World Bank. (2018). *Poverty and Shared Prosperity 2018: Piecing Together the Poverty Puzzle*. Washington, DC: World Bank. License: Creative Commons Attribution CC BY 3.0 IGO.

WPR (World Population Review). (2018). Accra Population 2018. Retrieved from *http://worldpopulationreview.com/world-cities/accra-population/*.

Zimmerer, K.S., Carney, J.A., & Vanek, S.J. (2015). Sustainable smallholder intensification in global change? Pivotal spatial interactions, gendered livelihoods, and agrobiodiversity. *Current Opinion in Environmental Sustainability,* 14, 49-60.

ISSN-Internet 2197-411x OLCL 862804632