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Resilient Governance Regimes That Support Urban Agriculture in Sub-Saharan Cities: Learning From Local Challenges

Mariana Vidal Merino, Sumetee Pahwa Gajjar, Aasha Subedi, Ana Polgar and Catherine Van Den Hoof*

PlanAdapt, Berlin, Germany

Local governments in Sub-Saharan Africa face the daunting task of high urban growth and potentially devastating impacts of climate change across local communities and the economy. Urban and peri-urban food production can be among nature-based strategies planned for improving urban food security, reducing emissions, and climate adaptation. Co-operative governance, strategic planning, and accountable institutions are needed to support urban agriculture (UA), in the face of climate risks, unplanned urban development, the gendered nature of food provision, and the inability of urban farmers to self-organize toward optimal market and land access outcomes. Using a case study approach guided by qualitative content analysis with information derived from web analysis, we apply the Institutional Analysis and Development Framework to analyze underlying governance factors for UA in three selected Sub-Saharan African cities. Our three case cities of Kampala, Tamale and Cape Town reveal that UA is beginning to receive policy attention toward food security, and recognition for generating environmental, ecological, health, and human well-being benefits. Literature from specific cities however does not yet signal a local awareness and policy thrust regarding the associated and pertinent climate adaptation benefits of urban agriculture. We therefore recommend trans-disciplinary, locally-led, planning-based, and multi-sectoral approaches, involving a range of stakeholders toward recognizing and achieving the climate adaptation, environmental (ecologically restorative) and food security benefits of pursuing urban agriculture. This signals a larger role for the practice in sustainability discourse and SDGs 2 and 11, scaling out and up across large, medium and small towns, and cities of Sub-Saharan Africa.

Keywords: collaborative governance, land use planning, Sub-Saharan Africa, urban agriculture, climate change adaptation, food security

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****Correspondence:***
Sumetee Pahwa Gajjar
s.pahwagajjar@plan-adapt.org

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INTRODUCTION

It is estimated that the urban population in Africa will increase from 650 million to more than 1.3 billion by 2050 (UN-DESA, 2019). For local governments in Sub-Saharan Africa, this implies managing the highest urban growth rate in the world while confronting the devastating effects of climate change cutting across local communities and the economy (UN-DESA, 2019; Global Clearing House for Development Finance, 2020).

The IPCC special report on Land and Climate Change states that urban and peri-urban food production can be among the strategies planned to improve food security, reduce GHG emissions, and prepare, respond and recover from the adverse effects of climate change in cities (Mbow et al., 2019). Urban agriculture (UA) fosters local adaptation through e.g., temperature regulation (Tsilini et al., 2015), biodiversity conservation (Lwasa et al., 2011), strengthening of ecosystem services (Lin et al., 2015) and improving urban food security (Lwasa et al., 2011; Davies et al., 2020; FAO, 2020). But urban and peri-urban agriculture is exposed to climate-related risk and increasing pressure over land due to population dynamics. Such factors and processes can hinder the potential of UA to provide broader benefits to society (Padgham et al., 2015).

Food insecurity increases the vulnerability of marginalized groups, such as low-income urban households, as it is experienced alongside multiple, interconnected deprivations such as poverty, health issues, low income, inadequate housing, insecure tenure and income, and climate vulnerability (Baharoglu and Kessides, 2001; Tacoli, 2013). Amidst the Covid-19 pandemic, FAO (2020) points to the relevance of urban food production as a way to achieve greater self-sufficiency. It also highlights the role of UA as a main strategy for urban food production and calls for the preservation of existing agricultural land in urban and peri-urban areas.

In the past years, UA has gained increasing attention, reflected in a growing body of literature on the topic. Unsurprisingly, the majority of publications focus on the analysis and discourse around UA and its role in addressing food insecurity. Few studies, however, look at the specificities of governance and institutions shaping the way UA is conducted (Crush and Frayne, 2014; Frayne et al., 2016; Shannon et al., 2020).

The main objective of this study is to create a deeper understanding of the governance factors that frame the implementation of urban agriculture initiatives in Sub-Saharan Africa as well as their impact on reducing vulnerabilities, such as food insecurity, and increasing resilience to shocks and crises. To do this, Section Introduction presents literature-based information on UA in Sub-Saharan Africa in relation to food security and climate resilience. It also provides a summary of the UA governance frameworks and related challenges. In Section Literature Review the application of the IAD framework in our methodology is explained. Section Methodology and Results analyze UA's underlying governance factors by looking at three selected Sub-Saharan African cities.

LITERATURE REVIEW

Urban Food Security and Climate-Related Risk

Many urban dwellers in low- and middle-income countries face food and nutrition insecurity (Revi et al., 2017). Rather than a general shortage of food, this is mainly explained by low incomes (Cohen and Garrett, 2010; Prain et al., 2010; Crush et al., 2012; Siegner et al., 2018). Low-income urban households allocate more than 50% of their total expenditures to food (Gbadegesin and Olajiire-Ajayi, 2020). This high food expenditure makes them vulnerable vis-à-vis long-term risks such as steady increases in food prices or short-term spikes associated with climatic disasters (Cohen and Garrett, 2010).

The climate-related risk associated with floods, drought, or other extreme events can lead to spikes in food prices in cities (Bartlett, 2008) linked to interruptions or disruptions of food supplies. To cope with increased food prices, low-income households may adopt different strategies, including changing their consumption habits, eating less, often low-nutritious food, or increasing their working hours to generate more income (Cohen and Garrett, 2010). Many of these strategies negatively impact the health of household members, especially the ones that are most vulnerable, such as women, the elderly and children.

The increasing number and concentration of people in cities often place food security in direct competition with other water and land demands, such as drinking water supply and bio-fuel production (Wilby and Keenan, 2012). Climate change is expected to intensify such conflicts as it may create new patterns of climate-related impacts, exposure and vulnerability (Douglas et al., 2008; UNISDR, 2009, 2011).

Urban Agriculture for Food Security and Climate Resilience

Urban agriculture (UA) has been defined by Davies et al. (2020) as "the growing of crops and raising small livestock on land within the urban boundaries of cities and towns (e.g., home gardens, vacant lots, roadsides, and balconies) for household consumption or sale in urban markets." Less than 12 years ago, about 14% of the world's population was nourished by food produced in urban and peri-urban areas (Kriewald et al., 2019). Nowadays, UA continues to be a prominent food source, especially for middle and low-income families (Gbadegesin and Olajiire-Ajayi, 2020).

Besides its valuable contribution to food security, UA can also contribute to the wellbeing of citizens and societies (Battersby and Marshak, 2013; Olivier, 2019), improving biodiversity, strengthening associated ecosystem services (Lin et al., 2015), reducing GHG emissions, and adapting to climate change impacts (Mbow et al., 2019). UA is by consequence tackling the achievement of several Sustainable Development Goals (SDGs), but especially those linked to no poverty (SDG 1); zero hunger (SDG 2); sustainable cities and communities (SDG 11) and climate action (SDG 13).

A review on Sub-Saharan Africa (Lwasa et al., 2014, 2015) shows that UA contributes to climate change adaptation in the cities by lowering the heat island effect, increasing water infiltration, and reducing run-offs associated with flooding (Lwasa et al., 2014, 2015; Kumar et al., 2017). A scenario analysis (Tsilini et al., 2015) also reveals the potential of urban green areas to reduce the surface temperature up to 10°C compared to similar areas without vegetation cover.

Despite the benefits listed above, UA has been criticized for its marginal contribution to food security in lower-income urban households (White and Hamm, 2014), particularly in African urban centers (Crush et al., 2011; Frayne et al., 2016). For example, a study by Davies et al. (2020) found that UA only

contributes marginally to household's food security in secondary and tertiary urban areas in Zambia and Kenia. Urban food systems may also bring about negative social and environmental effects, such as lower productivity and inadequate food supply as compared with modern large-scale agriculture (Smith et al., 2019), land use and water conflicts, and contamination of water sources (Gyasi et al., 2014; Bellwood-Howard et al., 2018; Ayambire, 2019).

However, the authors clearly state that UA can still play a significant role in the food and nutritional security strategies, given that other elements are considered. Such elements include making the food supply chain more efficient, improving conditions for farmers' markets, and financing infrastructure and production technologies (Cohen and Garrett, 2010). Further recommendations include fostering innovation to embrace alternative food sources and technologies (e.g., vertical farming), improving supply chains, enhancing of local social safety nets, among others (Weldegebriel and Prowse, 2013; Eakin et al., 2014; Lemos et al., 2016; Schwan and Yu, 2018).

Governance Frameworks for Urban Agriculture and Food Security

There is an increasing agreement on the importance of urban food systems, and consequently, increasing attention is placed on their governance and sustainability (Siegner et al., 2018). A global analysis conducted by Filippini et al. (2019) revealed that cities are developing urban food policies and measures that are being incorporated into cities' policy agendas to increase food security. Such initiatives may be driven by local actors and grass-root organizations or have a top-down approach. The same study shows that many of these initiatives are still early in their development as they have emerged in response to new challenges experienced in urban centers. Some cities, mostly from the Global North, successfully developed, and implemented comprehensive policies on urban food security. Contrary, policies in other cities are still on early development or actions were taken place in a disarticulated manner with low participation of relevant actors.

Urban food security requires integrated governance and the articulated work of institutions and stakeholders across a wide range of economic sectors such as agriculture, environment, health, and education (Mbow et al., 2019). But the governance of urban food security is challenging as it often lacks clear regulations. It falls within the responsibility of a range of government actors, many of which may have low implementation and control capacities and, in some cases, conflicting interests (Smits, 2018).

The informality that characterizes many cities in Sub-Saharan Africa, adds an additional layer to the urban governance challenges. By 2050, the population living in informal conditions will likely triple to about three billion (Satterthwaite et al., 2018). Such a growing population has coped with the absence of formal services by developing their own economic dynamics, which has been argued to be low-carbon and resource-efficient (see Brown and McGranahan, 2016). However, urban agriculture is still not part of most statistics, mainly because agricultural data is usually not disaggregated into urban and rural. As such, its contribution to the urban formal and informal economy remains underreported (Brown and McGranahan, 2016).

METHODOLOGY

This study uses a case study approach which is guided by qualitative content analysis, with information derived from web analysis. The selected case studies are analyzed using the Institutional Analysis and Development (IAD) framework to policy analysis and design proposed by Ostrom and Polski (1999) and Polski and Ostrom (n.d.).

Case Study Selection

Information on the case studies was collected through desk-based research based on literature review and policy analysis. An important criterion for the selection of case studies was the availability and extent of the information related to UA in a given country. A search on google scholar using the terms "Urban Agriculture" per Sub-Saharan African country was performed. The 10 countries with the highest number of publications since 2017 were further looked into. These included South Africa (4900), Kenya (4650), Nigeria (4200), Ghana (3740), Ethiopia (3400), Tanzania (2900), Uganda (2460), Malawi (1340), Cameroon (1220), and Sudan (1110). For those countries, a further web search was done in order to identify specific case studies of interest.

The final identification of cities was made considering the following criteria (1) UA as a widespread practice; (2) extend and information on UA available from the literature, especially in relation to governance factors; (3) geographical dispersion to provide a wider perspective of the different institutional arrangements in Sub-Saharan Africa. Even though there is an increasing body of literature on UA, few cities were eligible for our analysis due to the limited and incomplete information available on the institutional characteristics shaping UA in cities. The selected case studies were Tamale (Ghana), Kampala (Uganda) and Cape Town (South Africa). The general description of these cities and the characteristics of UA can be found in **Appendix A**.

For each case study, all relevant information found *via* web search, including scientific and gray publications as well as official documents, were considered to form a picture of the different elements shaping the governance around UA. The specific documents used for the analysis are cited accordingly in this document.

Case Study Analysis

The IAD framework is a tool that allows to analyze policy interventions implemented in a wide range of complex political-economic situations as well as to understand how institutions develop (Ostrom, 2011). This framework helps to understand complex social situations by diagnosing important elements of policy processes and breaking them down into manageable sets.

It identifies key elements in decision-making situations within the policy process, known as *action situations*, and the way these are shaped by external variables (Ostrom, 2011). Actors, both individuals and organizations, are the *participants* in an

action situation (*Ibid.*). They are influenced by their physical and socio-economic environment as well as laws and regulations (Heikkila and Andersson, 2018). The physical environment in which an action scenario is set is referred to as the *biophysical/material conditions*. The socio-economic features of the community that make up the social environment of the action situation are described by *attributes of community*. The rules represent the formal laws and regulations that facilitate or inhibit participant activity in an action situation's institutional setting (Ostrom, 2005). The outcome of an action situation, together with the interactions of the actors, are evaluated using various criteria determined by the participants and observers in action situations.

For each case study, a first scan of the available literature informed the decision about the Action Situation(s). The only criterium was the recognition of a relevant policy process influencing UA, that is, a process that could enable or hinder UA implementation and its provision of benefits. Once the action situation was recognized, available documents were revised to identify the action situation elements: participants, rules in use, attributes to the community, and biophysical conditions. The outcome of applying the IAD framework was the systematic analysis of a policy process that, in turn, was the basis for developing a narrative around the elements shaping the process, their interaction and outcomes.

RESULTS

In this section, the results of the analysis of the three case studies, using the IAD framework for policy analysis, are presented. The results are summarized in **Table 1**. This encompasses more specifically the unraveling of the physical conditions, attributes, rules-in-use, actions, pattern of interactions, and outcomes around UA and the institutional factors that support or inhibit UA to achieve greater food security in the cities that have been selected.

Case 1: Tamale, Ghana

Land-use conflicts in Tamale have received academic interest and coverage (see Fuseini, 2016; Akaateba, 2018) and so has the topic of urban agriculture. This paper draws from and builds on existing studies to offer an alternative lens to view the complex nexus between formal and informal land systems, spatial development, and their effect on urban agriculture in this city. In the interest of maintaining the focus on this nexus, other aspects and emerging issues regarding urban agriculture in Tamale, such as water access and quality, production technologies and inputs, crop commercialization, and access to markets, have been deliberately not addressed in this study.

Land Tenure and Land-Use System in Tamale

The land-use system in Ghana is a dual one, in which formal or statutory land tenure regulations co-exist with customary tenurial arrangements. The latter is the predominant one, with about 80% of the country's land under customary ownership (Fuseini, 2016). As such, most land is owned and managed by chiefs while the people enjoy only usufruct rights.

According to the land governance in Tamale, one way in which citizens could access land for agriculture is by requesting it to the traditional chiefs. Customarily, chiefs—who are the custodians of most of the land in Tamale city and surroundings—can grant land to a person in exchange for a token or gift. In present times, however, such tokens have been replaced by money. The monetarization of the access to land, together with the growth dynamics regarding infrastructure and service provision, has created pervasive incentives for allocating land to the highest bidder. As is the case, chiefs face strong claims of putting their own interests first and seek for profit before the public interests (Fuseini, 2016; Cabannes and Marocchino, 2018). Not surprisingly, land allocation to farming, which was common in the past, has been marginalized in favor of urbanization (Gyasi et al., 2014; Kuusaana and Eledi, 2015).

A second path through which citizens could access land for agriculture in the city of Tamale is by directly acquiring a permit from the metropolitan authorities. According to the 2016 Ghanian Land Use and Spatial Planning Act (Act 925), urban farming activities are allowed provided that the district, municipal, or metropolitan assemblies issue a permit. In practice though, the city does not have land officially zoned for agriculture, and the metropolitan authorities do not have a specific urban agriculture policy in place. Because of this, agricultural permits are not granted within the city of Tamale (Bellwood-Howard et al., 2015a).

As summarized above, the land governance in Tamale is complex and characterized by a lack of coherency between policy bodies and government units. Adding to this, land market speculation and the apparent corruption of the customary land use authorities generate difficult conditions for urban agriculture. As a consequence, agricultural plots are relegated to the periphery of Tamale, or within the city, to (1) areas around irrigation sources such as gutters, commercial pipes or reservoirs; (2) backyard farms located between houses or (3) individual farm plots on undeveloped building sites (Bellwood-Howard et al., 2015a). As a rule, most of these locations are not land secure; agricultural plots are constantly under threat of invasion by commercial and residential land users, or—in the case of public land—under eviction threats from the management of the public institutions whose land the urban farmers operate (Ayambire, 2019). As an example, Nchanji et al. (2017) reports that Buipela, once one of the largest sites of vegetable production in Tamale, has now almost completely disappeared, with more than 90% of its original area allocated to residential development and the construction of a slaughterhouse. This situation hinders the ability of urban agriculture to deliver benefits to livelihoods and creates significant challenges for the farming livelihoods in Tamale.

Legal Framework

The government of Ghana has set in motion several processes to address the weaknesses of its decentralized land-use system. The main one is the Land Use and Spatial Planning Act (Act 925), drafted in 2011 and passed into law in 2016 (Akaateba, 2018).

TABLE 1 | Results of the analysis of the three case studies; i.e., Tamale, Kampala and Cape Town, using the IAD framework for policy analysis (Ostrom, 2005).

IAD domain	Tamale (Ghana)	Kampala (Uganda)	Cape Town (South Africa)
Timeframe	2011–2020	2005–2021	2011–2020
Focus	Land use policy and Urban agriculture	Transitioning from Informal to Formal Governance Structures	Multi-sector approach to Governing Urban Food Systems
Sources	Bellwood-Howard et al., 2015a, 2018 in Gyasi et al., 2014; Kuusaana and Eledi, 2015; Nchanji et al., 2017; Cabannes and Marocchino, 2018; Edwin et al., 2020	Vermeiren et al., 2013; Sabiiti et al., 2014; Ministry of Land, Housing Urban Development, 2017; Mugisa et al., 2017; Kampala Capital City Authority (KCCA), 2019, 2020; Bidandi and Williams, 2020; Ruhweza, 2020; Mwesigye and Barungi, 2021	Battersby et al., 2011; Battersby and Marshak, 2013; Olivier and Heinecken, 2017; Paganini and Schelchen, 2018; Kanosvamhira, 2019; Crush et al., 2020; Gajjar, 2020; Haysom et al., 2020
Physical conditions	Increasing population (∼about 400,000 inhabitants) *About UA:* - Widely practiced, mainly by women. - Main purpose income generation and food security. - Practiced around water sources and in vacant housing plots all over the city. *Constaints of UA:* - Not recognized as valid urban land use category - Lack of legal framework - Not integrated in urban planning	City has 1.65 million inhabitants, with a rapidly growing population (5.2% annually). *About UA:* - Important source of food and employment - Mainly vegetable production and livestock keeping - Practices: fertilizer, irrigation, food towers, …. - Selling of produce on informal markets, as formal are inefficient. *Constrains of UA:* - Urban growth -> displacement to periphery -> increase transportation cost/time for selling (perishable) goods at central market. - Climate risks (e.g., floods). - Disease, theft, high cost of inputs and poor seed quality. - Waste management. - unawareness of the policies and non-conformity the existing regulations – - Inefficiency of the institution to provide services to the people due to various reasons: insufficient grant from the central government, understaffing of the organization, poor terms, salaries and benefits of the staff	Large population (∼4.6 million) and growing at 2.5% annually. The Philippi Horticultural Area (PHA) has been the breadbasket of Cape Town since historic times. *About UA:* - Practiced in densely populated areas, beyond the inner city - Practiced more by female-headed households - UA supplements food budget and generates income - Cultivation groups use derelict or waste land - Close to 90% of urban farmers use organic agriculture techniques such as compost, liquid manures, crop rotation *Constraints of UA:* - Poor soil quality and severe drought impede urban farming. - Benefits of UA are difficult to quantify, need greater policy attention - Critical deterrents such as land tenure, water access, spatial fragmentation, lack of self-organization - Vulnerability to government-mandated water restrictions
Attributes to community	Less than 47% of Tamale's population is classified as food secure. About UA: - Different discourses regarding land reform, drawing legitimacy from varied sources (history, culture, law). Urban farmers: - Majority subsistence farming for supplementary source of food or income, a small part leisure activity for wealthier class - Farmers perceive secured land based on social relationships of trust rather than legal status. - Perception that formalization of the administration of land rights is a complicated process.	Agriculture has improved nutritional outcome of the urban poor children. There is positive co-relation between household food security and number of livestock units, with improved weight among 2 to 5 years old - 1/3 households involved in UA is female headed. - ∼ 40% of households convert kitchen waste into manure and recycling mainly by higher educated heads. - < 50% of households had training on agricultural topics and member of agricultural association. Urban farmers: - Subsistence: cultivation for survival on wetland and public land, surplus sold. - Garden: cultivation for household, income from other activities. - Commercial: few, owner of land, selling produce.	- 45% households are food secure, 36% were severely food insecure. - Low-income, informal settlements suffer from high levels of food insecurity, especially female-headed households. *Urban farmers:* - Two types of urban gardens co-exist: backyard and market gardens. - A huge diversity among beneficiaries in terms of struggles and cultures, backgrounds, economic status. - UA provides a sense of meaning and empowerment for communities struggling with social ills. Incidents of sabotage and lack of trust do exist. - Around 4,000 backyard and market gardeners in different townships in Cape Town, have been trained by NGOs or the communal extension services to improve market access.
Rules-in-use	Ghana operates a hybrid system of land tenure/ administration: - Formal or statutory: public land used for public purposes (e.g., markets, waste disposal, hospitals) - Customary tenurial arrangements: land which is controlled by a group, clan or family and administered for the benefits of its members as well as those who acquire right of use through laid-down procedures and rules*	Uganda governs at the national and local level. - Uganda has four different type of land tenure system recognized by the Land Act 1998: customary, freehold, leasehold and mailo - Before 2005, urban farming illegal, then ordinance to regulate hygiene and way food produced and sold - Nationally, UA is supported by National Agricultural Advisory Services (NAADs) and Kyanja Agriculture Resource Center	South Africa governs through three interdependent spheres of government at national, provincial and local scales. - Nationally, urban agriculture is considered crucial for poverty alleviation; enabled through the City of Cape Town (2007), which guides the allocation of inputs, resources, training and land for urban farming in the city and the City of Cape Town (2013) aimed at collaboration between various actors (various)

(Continued)

TABLE 1 | Continued

IAD domain	Tamale (Ghana)	Kampala (Uganda)	Cape Town (South Africa)
	- About 80% of the land in Ghana is customarily owned. Public land is acquired from the customary sector.	- City government actively promotes UA increase food security, household income and employment - Competition for land, weak tenure position for many subsistence farmers on institutional and public land - Requirement of permit from council to farm in Kampala (UA is permitted on all land except wetlands, parks and land to be developed).	- More recently, the local governments' agency in achieving sustainable food systems, is recommended through the adoption of Food Sensitive Planning and Urban Design, enabled by planning legislation at all three levels of governance. - An "all of society" approach is recommended by the IUDF, 2016, which guides local governments in achieving sustainability goals through spatial transformation - Land tenure has been cited as a challenge by residents
Action arena	*Action situation* UA is practiced by 44% of households in Tamale and is an important contributor to food security. - The Land Use and Spatial Planning Act (Act 925), drafted in 2011 and passed into law in 2016, aimed to revise and consolidate the laws on land use and spatial planning, provide for sustainable development of land and human settlements through a decentralized planning system […] and to regulate national, regional, district and local spatial planning. - Between 2011 and 2016, a multistakeholder process to took place. And consolidated into a Multi-Stakeholder Forum (MSF) on urban and peri-urban agriculture. - A main topic within the MSF was the availability of land for urban agriculture and discussions on the informal status of the activity. *Actors:* Farmers and their associations; Local Assemblies; Traditional Chiefs & the traditional land secretariat; Tamale's Metropolitan Assembly incl. its the Town and Country Planning Department (TCPD); NGOs such as the Urban Agriculture Network URBANET and the Resource Center on Urban Agriculture and Food Security (RUAF); the Ministry of Food and Agriculture (MOFA); among others.	*Action situation* UA is practiced by 50% of households in Kampala and is an important contributor to food security. The Kampala City Council legalized urban agriculture enforcing various ordinance to ensure health and quality standard for meat, fish, agriculture, milk and livestock City authority perceive the informal food market as a threat by city authority and are evicted citing lack of proper hygiene to handle food. Urban agriculture unit has been established within Kampala City Council Direct engagement by city authorities in instituting the ordinance *Actors:* Urban farmers; Policy makers (e.g., city authorities); Urban planners; NGOs; Others (e.g., landowners, …), urban producer association, urban agriculture practitioners: school, health centers, prison, police barracks	*Action situation1:* UA contributes negligibly to food security and income generation in Cape Town (through research) - The motivations for UA are health and ecological reasons. - The main challenges to generate enough for access to formal markets cited by urban farmers were access to markets, access to transport, weak soil health and since 2017, severe water restrictions. - Despite presence of state and non-state actors, actions lack co-ordination toward reaching the economic and health potential of urban farming. *Action situation2:* UA holds the potential for achieving food security and substantial income generation for urban farmers (through practice) - The COVID-19 pandemic triggered higher levels of indigency among the most impoverished and historically disadvantaged communities in South Africa. - Local NGOs stepped up efforts to service urban farmers in their network and to help establish new backyard and community food gardens. - Local NGOs in food production relaunched manure supply runs to small-scale farmers and extended regular mentorship. - With limited government support, the NGOs used digital technology to conduct on-line trainings during lockdown. *Actors:* Farmers networks; Municipal Government; Western Cape department of Agriculture; Department of Economic Development Finance Directorate—property management department; Social Development Dept. —Early Childhood Directorate; Consumers, high-end restaurants; Life-style markets; Research networks—AFSUN, HCP NGOs are significant actors; Early Childhood Centers
Patterns of interaction	- Between 2011 and 2016, the Multi-Stakeholder Forum (MSF) on urban and peri-urban agriculture was formed and active with broad participation of stakeholders. It was led by NGOs and not by local authorities as would have been desirable. - Traditional authorities criticized Tamale's Metropolitan Assembly and the TCPD staff members for being inefficient.	- The role of urban planners and policy makers is considered to have a direct impact on the future of many subsistence farmers with a weak tenure position. - The dominant type of Land Use System is residential development - Locals consider formal food markets, mostly open-air markets as major source of fresh food supply.	- Cultivators from the same area pursue collaborative livelihood strategies to share production costs. - The theory of social capital is invaluable to enable links between farmers and supporting organizations. - NGOs have been the main instigators of UA activities, connecting cultivators to the markets for income generation, and to public institutions to assist in facilitating land access.

(Continued)

TABLE 1 | Continued

IAD domain	Tamale (Ghana)	Kampala (Uganda)	Cape Town (South Africa)
	- Traditional authorities themselves faced allegations of corruption and usurpation of powers of the TCDP, converting farmlands into residential plots for profit and disregarding official planning regulations. - Despite a desire for formalization, farmers may not be whiling/be unable to pay for space in designated agricultural zones.	- Small scale urban farmers struggle to ensure regular and consistent supply to meet the demand of supermarkets - There is increased competition between agriculture land users and non-agriculture land users - Residents are using prohibited land such as road reserves, wetlands, greenbelts etc. for agriculture - Some urban farmers started using rooftop rainwater harvesting to irrigate crops - Kampala city has Agriculture Advisory Service Officer who is in charge of the NAADS programme in the city - Kampala Capital City Authority (KCCA) strategies has been aiming to transform UA from subsistence farming to commercial agriculture.	- Inclusive urban initiatives require information about the collaboration between farmers and supporting organizations. - As a result of the current food and nutrition policies, food production is an unfunded mandate for local governments in SA. - The SPLUMA (Spatial Planning and Land Use Management Act) provides normative spatial development principles for decision-making for all spheres of government: spatial justice, spatial sustainability, efficiency, spatial resilience and good administration.
Outcomes	- The enforcement of Act 925 is ongoing. No impacts of the implementation of Act 925 in the way UA is conducted in Tamale have been reported. - Although informal, urban food production is tolerated and prevails. - The perception of different stakeholders regarding land functions differs (e.g., agriculture, buffer zone, residential) - By 2016, the Tamale stakeholder process identified several areas for policy attention and produced a policy narrative. A local strategic agenda for UA that outlined a common vision for the development of UA in Tamale was developed. - Between 2004 and 2014, a 22.4% decrease in urban area allocated to open space vegetable farming has been reported. As urbanization increases, farmers continue to be pushed unto less favorable sites, peri urban areas or restricted to unauthorized public spaces in order to continue production. *Recommendations:* - Implement the local strategic agenda for urban agriculture. Improve land tenure, establishing more secure ways to access agricultural plots in and around the city of Tamale. - To include UA as part of the Local Plans a mapping of potential production areas within and around the city of Tamale would be a valuable first step. - Implement the above-mentioned recommendations under the leadership of the Tamale Metropolitan Assembly and with wide participation of relevant actors.	- Due to positive contribution of UA to food sufficiency, the city authority is continuously changing its legal and administrative framework conducive to urban agriculture - Urban agriculture well recognized under the Poverty Eradication Action Plan (PEAP) - Ministry of Land, Housing and Urban Development, 2017 proposes UA as one of the strategies for socio economic transformation and development - KCCA ongoing strategy 2020/21-2024/25 has prioritized UA as a strategy under local economic development plan - Rezoning into urban agricultural production zones, namely the core zone, intra-urban and peri-urban zones. - Implementation of the projects like edible landscape project to support UA and strengthen existing ordinance. *Recommendations:* - Protect (peri-)urban land for food production, advantage for organization of mobility/infrastructure and provision of utilities/social services, allow to better cope with climate risks. - Optimize benefit and minimize risk of waste reuse. - Provide food on markets with acceptable quality, price and hygienic conditions. - Providing training on: use of household biodegradable waste; irrigation water management strategies; agronomic and marketing aspects. - Recognition and Investment in informal food market. - Increase of access to infrastructure/assets for UA. - Increase knowledge on agriculture.	- Cape Town boasts a diversified urban agricultural sector with multiple actors, cross state and non-state domains, in addition to farmers. - A difference in the framing of the benefits derived from UA among state officials (economic and food security) and cultivators (social and personal) yields different approaches to UA. *Recommendations* - The economic and health benefits of urban agriculture can be attained by studying, recording and leveraging the networks of existing NGOs, which were active and successful during lockdown. - Local government can unlock its agency in sustainable food systems, by applying the transversal approach of food sensitive urban planning. - Multiple research networks have produced knowledge related to the state and nature of household level food security, social capital and diverse benefits of urban farming, which can inform a multi-sector approach to urban food systems. - The 2017 drought severely restricted food production across backyard and market gardens. This needs policy and planning attention toward improved water security in the region.

This encompasses more specifically the unraveling of the physical conditions, attributes, rules-in-use, actions, pattern of interactions and outcomes around UA and the institutional factors that support or inhibit UA to achieve greater food security in these three cities.

The Act 925 aims to "revise and consolidate the laws on land use and spatial planning, provide for sustainable development of land, and human settlements through a decentralized planning system [. . .] and to regulate national, regional, district and local spatial planning [. . .]" [Land Use and Planning Act (2016) (Act 925), 106, 2016].

Act 925 introduced a hierarchical spatial planning model with three levels for the whole country, comprising the development of Spatial Development Frameworks (SDFs), Structure Plans (SPs), and Local Plans (LPs) (Akaateba, 2018). In 2016, stakeholders who participated in the Multi-Stakeholder Forum (MSF) on urban and peri-urban agriculture in Tamale indicated that spatial planning was expected to become more participatory once Act 925 was passed. City planners would be required to consult citizens during the development of the Local Plans, which would open a way to put agriculture on the city development agenda (Bellwood-Howard et al., 2018).

Following Act 925 and the complementary Local Government Act (Act 936), also passed in 2016, the Tamale metropolitan authority—the Metropolitan Assembly -, is legally recognized as the highest political, administrative, planning, and rating authority in its area of jurisdiction.

Through the Town and Country Planning Department (TCPD), the Metropolitan Assembly is the sole authority in charge of preparing and approving Structure and Local Plans, as well as enforcing development control regulations, granting physical development permits, and enacting by-laws. Traditional authorities are expected to engage with the TCPD in the creation of local land-use plans as a result of this constitutional mandate.

While the enforcement of this new formal land use and spatial planning system is still ongoing, most decisions concerning the implementation of the Local Plan are still made by the traditional chiefs, and the implementation of Local Plans remains limited (Akaateba, 2018). The lack of logistical capacities and insufficient training and motivation of the TCPD staff, and the constitutionally guaranteed powers of chiefs over land allocation are some of the reasons behind the low success of the new land use and spatial planning system (*Ibid.*).

Recent literature also questions the success of the new legislation in increasing the involvement of local stakeholders in land use planning. A study by Poku-Boansi (2021) reveals an absence or limited participation of citizens in the land use planning process. He attributes the high incidence of non-compliance to the failure of authorities and city planners to meet the interests of stakeholders. This was already a problem reported by Bellwood-Howard et al. (2018) back in 2016. TCPD authorities manifested a lack of participation during the consultations over land zoning in Tamale, which contributed to the persistence of different perceptions of land by different stakeholders.

Lastly, the predecessor of Act 925, the Local Government Act 426 (1993), was questioned by several authors (see Nchanji et al., 2017; Bellwood-Howard et al., 2018; Nchanji, 2018) for discouraging urban agriculture as it prohibited farming without due permission within settlements of over 5,000 inhabitants. Act 925 has, however, not introduced any changes in this regard.

Stakeholder Participation

Despite the limitations mentioned above and the lack of political attention and legitimacy, numerous stakeholders, notably non-governmental organizations, acknowledge the benefits of urban agriculture (Nchanji et al., 2017). This interest motivated the establishment of a Multi-Stakeholder Forum (MSF) on urban and peri-urban agriculture, driven by the Resource Center on Urban Agriculture and Food Security (RUAF), the Ghana WASH Alliance Programme, University for Development Studies, the International Water Management Institute, the UrbanFoodPlus research project and facilitated by the Urban Agriculture Network URBANET (Bellwood-Howard et al., 2015b).

The MSF has served since 2011 as an intermittent space to discuss issues related to urban agriculture as well as sanitation and waste management. Other stakeholders, including the municipal authorities, research organizations, NGOs, traditional authorities, and representatives of farmers and traders, also participate in this space. Due to the large involvement of different stakeholders, the MSF enjoys legitimacy and has served in the past as a platform to discuss the emerging tensions between urban agriculture and spatial development priorities in Tamale (Bellwood-Howard et al., 2018). In this regard, primary concerns included the diminishing availability of land for agriculture and the lack of formal consideration of agriculture as an urban land use (*Ibid.*).

Bellwood-Howard et al. (2018) documented the different interests and perceptions gathered around the above-mentioned concerns. Among others, the traditional authorities blamed the lack of public spaces for i.e., agricultural production on the TCPD staff, who according to them had failed to acquired enough land from them. On the other hand, TCPD members reported that the traditional authorities continued to allocate land for residential purposes for profit disregarding the law. They also expressed their willingness to initiate participatory land zoning processes. In practice though, such participatory process never materialized. Another important stakeholder, the farmers themselves, were in favor of formalizing urban agriculture but contradictorily, they were not willing or not able to pay for the use of land for production.

Despite the diversity of opinions and interests in urban agriculture represented in the MSF, in 2014 stakeholders of the MSF agreed on a City Strategic Agenda on urban and peri-urban agriculture. This agenda summarizes the joint vision of the stakeholders within the MSF for urban and peri-urban agriculture as a way to "ensure food and nutrition security in a resilient and sustainable city" (Bellwood-Howard et al., 2015a, p.7). The agenda also contains several strategic objectives and actions between 2015 and 2020, including measures to demarcate and register agricultural land and spatial zoning in collaboration with the traditional authorities and the metropolitan authorities (*Ibid.*).

The MSF provided a space to discuss and find solutions to the problems of urban agriculture in a participatory manner. As such, it is a first valuable step toward official recognition of this production system. But the MSF has been criticized for being led and funded by NGOs (Bellwood-Howard et al., 2018). Leadership by public sector actors would legitimize and enhance the sustainability to these participatory processes. The implementation of the City Strategic Agenda on urban and peri-urban agriculture would certainly help legitimize this activity and help mainstream it to the relevant local institutions.

Outcomes and Recommendations

Despite the limitations to access land area and increased eviction pressure, urban agriculture is practiced by about 44% of households in Tamale. It has and continues to play an essential role in food security and income diversification (Bellwood-Howard et al., 2018). The failure of formal governance structures to support urban agriculture has given space for developing a parallel informal framework that is socially accepted and politically tolerated. However, this framework also does not benefit agricultural producers, whose interests are undermined by more powerful players and real estate market dynamics.

Recommendations regarding land tenure include establishing more secure ways to access land for agriculture in and around the city of Tamale. This can be achieved in several ways, including formal mechanisms such as legal title and law enforcement, as well as informal mechanisms such as community legitimacy and rights enforcement (Gyasi et al., 2014).

The first step for this could be the mapping of potential production areas. This mapping exercise could serve as a basis for suggesting zoning areas for agriculture which, in turn, could inform the development of an urban agricultural policy for the city of Tamale (Kuusaana and Eledi, 2015). Ideally, such an initiative would take place under the leadership of the Tamala Metropolitan Assembly (Bellwood-Howard et al., 2015b) with the active participation of other local authorities and community members (Gyasi et al., 2014).

When identifying land for agriculture, areas that deliver ecosystem functions and help reduce climate-related risk should be given priority. In Tamale, this is the case of open spaces, as well as reserve and buffer areas such as valley-bottom lands, which can help mitigate flood risk and make the city more resilient against a potential increase in heavy rainfall with climate change (Gyasi et al., 2014; Fuseini, 2016).

Extreme heat and flooding have a long history in Tamale, with multiple severe events recorded since 1950 (Kayaga et al., 2021). Poor urban governance, particularly inadequate planning and encroachment on waterways, is seen as responsible for the frequent and increasing incidents of flooding in Ghanaian cities (Fuseini, 2016). Besides the well-documented contribution to livelihood diversification and food security, urban agriculture in Tamale also holds the potential to deliver ecosystem services and support climate change adaptation and mitigation (Gyasi et al., 2014; Padgham et al., 2015; Fuseini, 2016). Regrettably, the current structures and general characteristics governing the agricultural production in the city of Tamale hinder its contribution to shaping Tamale into a sustainable and resilient city.

Case 2: Kampala, Uganda

Land Tenure and Land-Use System in Kampala

Uganda has four legally recognized multi-layered land tenure systems: customary, Mailo, freehold, and leasehold (Mwesigye and Barungi, 2021). Mailo land tenure refers to the land given to the Buganda royal family, chief and others to own land as their personal property. Mailo land tenure was created by the 1,900 Buganda Agreement between the colonial government and the Kingdom of Buganda. The dominant system is customary tenure, accounting for 80% of all land, followed by the Mailo system. These two systems have limited land tenure security and land rights. The customary land tenure system is changing from communal to more private land ownership. In the communities where land rights are more privatized, the individual has the full right to sell land without prior approval from a family member or clan head. In contrast, this provision is absent in communities with weak private land rights. Similarly, landlords with complete rights and tenants and occupants with usufruct rights characterize mailo land tenure (*Ibid*). Last, freehold and lease hold land tenure systems both provide more secure land rights than the other systems, but the total land under these categories is negligible.

The random and uncoordinated development caused by lack of qualified planners, weak institutional structures and government policies directly impacts urbanization and urban sprawl (Bidandi and Williams, 2020). Increased competition between agricultural and non-agricultural users has led to the urban poor settling in marginal lands such as wetland areas, exposing them to climatic risks such as flooding. Wetland areas, which are also crucial for regulating flood and filtering sediments, are encroached by new settlers who are farming and producing bricks with clay soil dredged from the wetlands (Sabiiti et al., 2014). The most dominant land use type in Kampala is residential. Sabiiti et al. argue that the explosive growth of the urban population between 1974 to 2008 has contributed to fast-paced land-use changes at the expense of agricultural lands. Vermeiren et al. (2013) projected an increase of the total built-up area from 386 Km^2 in 2010 to 1,000 km^2 by 2030. As such, there is an increasing challenge to acquire land for housing, industries, public infrastructures, and other amenities, causing a negative impact on planning and creating tension between landowners, private persons, urban authorities and the central government.

Legal Framework

The land act 1998 of Uganda recognizes all four above-mentioned land tenure systems, making the act weak in promoting planned urbanization. A large share of the land in Kampala is privately owned (Mailo land) by local people. This poses challenges in promoting planned urbanization since private landowners have full rights over their land (Bidandi and Williams, 2020). The Kampala City Council legalized urban agriculture and enforced various ordinances to ensure health and quality standards for production. The urban agriculture ordinance of 2006 bans urban farmers from practicing urban agriculture without a proper permit and a valid license issued by the Kampalaf Capital City Authority (KCCA). This ordinance also prohibits agriculture on public lands such as road reserves, wetlands, greenbelts, parks, landfills and other areas declared toxic by the city authority. It also prohibits the use of manure that has not been treated. Yet, many subsistence farmers disregard these regulations or are unaware of them (Sabiiti et al., 2014). Institutional and public grounds in Kampala are often used illegally or under informal tenure arrangements for agriculture: a situation that is considered both illegal and unsustainable by the city authorities (Vermeiren et al., 2013).

Stakeholder Participation

Urban agriculture in Kampala is shaped by a rich variety of actors and activities. There are three different typologies of urban farmers: (i) subsistence farmers, who produce food for household consumption and sell remaining food to complement household income, (ii) garden farmers, who have another primary occupation and produce food for self-consumption, and (iii) commercial farmers, who farm at large scale and for whom agriculture is the primary source of income. The majority of urban farmers producing vegetables, poultry and livestock in Kampala are female. Men are primarily engaged in pig and cattle rearing, which involves trading activities.

Kampala has two common food market types: formal and informal ones. Traditional open-air markets are formal and a major source of fresh food in the city. Similarly, supermarkets, also formal markets, are increasingly popular. However, informal food sellers such as stock stores, illegal booths, and street/pavement vendors provide a substantial portion of the produce consumed in Kampala. In these markets, products are sold at relatively low prices compared to department stores and formal food markets, and as such, are more accessible to urban residents. Unable to deliver a constant supply, most urban farmers in Kampala channel their products through these informal markets. However, the urban food outlet faces a constant threat from the city authority. The trade ordinance 2006 ensures the eviction of informal food markets, citing a lack of hygiene in the handling, transportation and storage of food.

In addition to urban farmers, Sabiiti et al. (2014) specifies four different categories of urban agriculture practitioners in Kampala: school, health centers, prison, and police barracks. Information on the engagement of other stakeholders, particularly research institutes, and non-governmental organizations, could not be found in the literature.

Outcomes and Recommendation

Urban agriculture is practiced by 50% household in Kampala city and it is considered as a contributor to food security. Before 2005, the livestock around the city was considered a public health risk, while tall crops around cities were believed to be the reason for accidents. The city administration is gradually receiving urban farming in Kampala more positively (Sabiiti et al., 2014). The city government is gradually modifying its legal and administrative framework to make urban agriculture more viable. Urban agriculture is well recognized by government and city authority programs under the Poverty Eradication Action Plan (PEAP). The National Agriculture Advisory Services (NAADS[1]) has integrated urban agriculture into its implementation framework extending its target areas from rural to urban. Based on population density, land availability, and crop and livestock production prevalence, the KCCA rezoned the city into urban agricultural production zones, core zones, intra-urban zones, peri-urban zones. One Agriculture Advisory Service Officer in charge of the NAADS programme is assigned for Kampala city who oversees agricultural activities in the city. The city authority has leased land for the Edible Landscape Project to further support the urban agriculture in Kampala. This goal of this project is to make urban agriculture a permanent part of city planning and low-income housing design.

More recently, the National Urban Policy of 2017 proposed urban agriculture as one of the strategies for socio-economic transformation and development (Ministry of Land, Housing Urban Development, 2017). Likewise, the KCCA ongoing strategy 2020/21-24/25 has prioritized Kampala city urban agriculture as a strategy under the local economic development program. This strategy is in line with Uganda National Development Plan[2] III. The Kampala urban agriculture program is aiming to transform urban agriculture from subsistence farming to commercial agriculture [Kampala Capital City Authority (KCCA), 2020]. Kampala city has integrated urban agriculture into the city's Slum Development Plans to engage more youth in agriculture (Ruhweza, 2020).

Some recommendations include the need for city authority and central government to work together with communities and landowners to achieve planned urbanization in new sprawling areas and include community leaders at the grass root level in the planning process (Bidandi and Williams, 2020). The spontaneous and uncoordinated urban area expansion remains a challenge either due to lack of government policies, weak government regulation, weak institutions and structures, and absence of qualified urban planners. Unplanned growth of the urban boundary and lack of urbanization policy poses a challenge to Kampala city, forcing the poor to settle in marginal lands such as wetlands and low land forest around the city. Vermeiren et al. (2013) suggest that due to unplanned urbanization, the poor people will be living in steep slopes and flood-prone wetlands by 2030 or move to remote areas. Mwesigye and Barungi (2021) argue that tenure security is an essential factor for the commercialization of crops. While KCCA's ongoing strategy 2020/21-24/25 has prioritized Kampala city urban agriculture as an economic development programme, the land act has not been appropriately revised, including large-scale urban agriculture. Therefore, a balanced urban planning policy is needed in Kampala city targeting the urban poor with weak land tenure, providing a sustainable alternative for farmers who may lose land due to urban development or law enforcement (Ruhweza, 2020).

Flooding is a significant risk posing a compound threat to urban agriculture in Kampala, contributing to disease outbreaks and loss of other livelihood options. The vegetable plots near informal settlements in wetland areas are washed away by flooding. Apart from flooding, the urban farmers also listed additional climate risks such as drought, heat stress exacerbated by urban encroachment, land degradation, etc. As a result, reducing flood risk and adapting to climate change are essential goals for Kampala. Maintaining permeable surfaces through

[1]The National Agricultural Advisory Services Organization is a semi-autonomous public agency under the Ministry of Agriculture Animal Industry and Fisheries (MAAIF), responsible for public agricultural advisory/extension services.

[2]National Development Plan (NDP) is the third in a series of six NDPs that will guide the nation and deliver the aspirations of the people of Uganda, as articulated in Uganda Vision 2040. NDPIII (2020/21 – 2024/25) aims to build on the progress made, lessons learned from the planning and implementation experiences of NDPI and NDPII, and also seek to surmount some of the challenges encountered.

agriculture, wetlands, and forest remnants could help to reduce flood risk. This will help manage floods and support the urban food system (Sabiiti et al., 2014).

The informal food market contributes to affordable food for the urban poor, yet these are considered a threat by the city authority. The city authority needs to recognize the contribution of informal food markets and integrate those informal food markets into the city planning process. Likewise, informal food market actors should organize across their value chain to make their voices heard.

Case 3: The City of Cape Town, South Africa

There are three inter-related threads or narratives on challenges associated with policy and practice that emerge from the literature on urban agriculture, specific to Cape Town, when the IAD framework is applied. The first is related to the evolution of policies as the rules in use, which respond to the high levels of income inequality and food and nutritional insecurity in more than 30% of the population. Secondly, for communities that struggle with crime, domestic violence, drug abuse and high levels of unemployment, UA provides a hard to quantify sense of meaning and empowerment beyond ecological and economic benefits (Olivier and Heinecken, 2017; Kanosvamhira, 2019). The attributes of the urban farming community in Cape Town exemplify both their struggles with poverty and food insecurity, and an ability to rise above them, collectively. Thirdly, the discipline and practice of urban planning heralds a solution space that can integrate the experiences, knowledge and contributions of multiple stakeholders toward a spatial articulation of UA, within the city's landscape, and aligned with locally-driven action.

Multiple Policy Responses

In Cape Town, the policies around the thematic of UA focusses on poverty alleviation, through the food, nutrition and economic status of urban farmers. Given the high level of food insecurity and hidden hunger among the residents of informal and low-economic settlements in the city, as revealed through series of research projects aimed at understanding the nature and state of food insecurity, food security is linked at the policy level with social and economic development, and more specifically, with poverty alleviation and reduction (Battersby et al., 2011; Crush and Riley, 2018; Haysom et al., 2020).

The association of urban farming as a countermeasure against food and nutrition insecurity led to the promulgation of the Food Gardens Policy (FGP) of (2013) (Department of Social and Economic Development), in addition to the previous Urban Agriculture Policy (UAP) of 2007 (Department of Agriculture) (Kanosvamhira, 2019).

The UAP guides the allocation of inputs, resources, training and land for urban farming in the city and is aligned with the national view on urban agriculture, in that it can be crucial for poverty alleviation, by addressing food insecurity (Olivier and Heinecken, 2017). The UAP also guides activities where a group of people come together to produce food collectively, such as communities and NGOs. Soil for Life, a significant UA NGO in Cape Town has an official Memorandum of Understanding with the City of Cape Town, enabled by the UAP (Kanosvamhira, 2019). The FGP governs the establishment of sustainable food gardens to achieve food security in low-income areas. The FGP supports food gardens in Early Childhood Development Centers to provide nutritious meals (City of Cape Town, 2013). Aligned with national and provincial mandates, as well as the local government strategic priorities, the FGP envisions people to be active champions of their own development. While such arrangements extend the social capital of urban farmers by connecting them with private markets and relevant government departments (to allot land for instance), the agency of local government remains under-resourced and unrealized in such a configuration (Haysom et al., 2020). For a majority of urban farmers, UA contributes to food and income, but the scale is negligible, with famers dependent upon government support such as income grants (Paganini and Schelchen, 2018).

Secondly, farmers cite land tenure, water access, spatial fragmentation of the city (and the related problems of transport and market access), time poverty (especially among female urban farmers due to the increased share of care-giving functions they perform in families and households) and lack of self-organization into sustained formal or informal groups as critical deterrents in actualizing the economic benefits of UA (Paganini and Schelchen, 2018; Kanosvamhira, 2019). There is evidence of increased policy attention and alignment from higher levels of governance (national and provincial), domain knowledge generated through ongoing research and enquiry, and the presence of established, well-connected networks through non-state actors. However, the piecemeal solution space in the form of establishing food gardens and running time-bound projects (e.g., establishment and support of community gardens linked to early childcare centers), with limited continuity, eluded the potential of achieving a sustainable food system in the city.

Social and Personal Benefits of UA

Cape Town boasts a huge diversity among community actors in terms of struggles, cultural backgrounds, and economic status (Kanosvamhira, 2019). Collaborative work strategies sharing physical and human resources are often employed in the pursuit of community gardening, and yet there are incidents of sabotage and lack of trust, among neighbors in impoverished communities (Olivier and Heinecken, 2017). To circumvent this lack of trust, NGOs host networking events and train neighboring farmers together (Olivier and Heinecken, 2017), while also involving experienced farmers as mentors and trainers of new farmers.

The theory of social capital has been applied extensively to understand and enable the links between farmers and supporting organizations in the city, a key characteristic of the community. Three kinds of social capital, theoretically, are discussed in relation to UA in Cape Town: bonding, bridging and linking capitals (Kanosvamhira, 2019). Olivier and Heinecken (2017) note that UA strengthens household bonds, community networks and livelihood strategies among poor social groups. For example, cultivators from the same area often work together to share production costs, thus yielding collaborative livelihood strategies. Bonding capital refers to the trust and capacity for collaboration between family and friends, and acts as the first motivator but is

not sufficient to keep cultivators engaged (Olivier and Heinecken, 2017). Bridging capital, which extends beyond immediate circles, to include networks between supporting organizations and cultivator groups, helps facilitate access to resources (Olivier and Heinecken, 2017). Non-state actors, such as NGOs, perform both bridging and linking functions, by connecting cultivators to markets and public institutions, that help in facilitating access to land (Kanosvamhira, 2019). Linking capital and enabling connections to markets and government are crucial for unlocking the profitability of pro-poor farming toward the long-term sustainability and scalability of UA in Cape Town.

Of the four types of farming communities (Olivier and Heinecken, 2017), the home cultivators and informal cultivator groups work through informal networks, while the institutional and community garden farmers, are able to engage with and through formal structures of the market and government departments. Through the intermediary role of NGOs, home cultivators and informal groups are able to eventually build bridging and linking capital; build trust and access resources formally. The cultivators of Cape Town have found the practice of UA to be personally empowering, uplifting and enriching, with many physical and psychological benefits being cited (Olivier and Heinecken, 2017). All elements of UA, whether formal or informal, including training of other farmers, supporting each other through difficult financial times, learning from networks beyond the immediate community, and more recently, engaging in productive activities during the pandemic, generate positive outcomes for the farmers, and contribute significantly to their sense of purpose and well-being.

Emerging Coherence Across Policy, Planning and Practice Domains

As Haysom et al. (2020) note, the majority of the South African population (63%) is living in urban areas (63%) and yet planning for food is missing from urban planning and urban governance practices. Due to the current food and nutrition policy architecture, and the emphasis on the food production for household consumption to alleviate poverty and food insecurity, not all the sustainability goals of UA are acknowledged. At the same time, locally-led efforts during the COVID-19 pandemic, in the arena of UA, show the potential for innovation and collaboration from different actors, such as NGOs, and community members (Gajjar, 2020).

The drought of 2017 has highlighted the vulnerability of UA to government-mandated water restrictions (Paganini and Schelchen, 2018), which needs to be addressed through integrated solutions, cognizant of future climate trends. In the above context, the Spatial Planning and Land Use Management Act (SPLUMA) along with planning legislation promulgated in parallel at provincial and local spheres of government since 2015, may hold the potential to address the unintended disconnect between urban planning and food system functioning (Haysom et al., 2020). Kanosvamhira (2019) also notes that sustainable monitoring and record-keeping of financial support from the provincial department is lacking; this would support greater transparency. The SPLUMA provides normative spatial development principles for collaborative decision-making across the three spheres of government. These principles include spatial justice, spatial sustainability, efficiency, spatial resilience and good administration (Haysom et al., 2020). They provide a strong basis for guiding urban governance for a sustainable food system, through for example a land-use based monitoring system.

UA in Cape Town, as with other sustainability-oriented practices, are bound to aspects of land-use and land ownership. Related to the country's apartheid past, land tenure and ownership (and housing) are highly contested, problem areas for local governments to address on their own. A *Food Sensitive Planning and Urban Design Approach* (Ilieva, 2016) posits spatial planning as the entry to address the multiple challenges faced by the various actors involved in UA; such as finance, transportation, land availability and access, spatial connectivity, and food consumption (Haysom et al., 2020). It encompasses the additional senses of time, history, human connection and meaning, often missing in policy approaches focused on agriculture as an economic sector, or urban agriculture as a means for addressing hunger and nutritional poverty. By incorporating the aspect of land availability and access to land, the foundational issue of where UA can be practiced, is brought into the space for dialogue and solution design.

Furthermore, South African cities are guided by the IUDF, 2016; which promotes the dual practice of co-operative governance (across the three spheres of government) and participatory governance (with grass-roots movements and civic groups) (Swilling et al., 2019). The "all of society approach" (IUDF, 2016) is particularly relevant for UA in Cape Town, which faces severe climate change impacts such as droughts (on a regional or national scale) and floods (on specific locations due to topographical conditions and rainfall occurrence), exacerbating the vulnerability of poor residents further.

Outcomes and Recommendations

While community and home gardens were both, at the start, supported by the UAP and the FGP, the community gardens initiative has been terminated due to lack of sustainability (Paganini and Schelchen, 2018). Home garden projects are found to support food production in low-income households (Kanosvamhira, 2019), and experienced a surge during the COVID-19 lockdown (Gajjar, 2020). These changes suggest that a closer understanding of the agency of different actors is needed to inform policies and support from state actors. Existing research through the lens of building social capital, supports the practice of UA, for personal and social well-being of impoverished households, among the vulnerable communities of Cape Town. Recent explorations into the rise of urban farming during the pandemic, indicate that there are potentials for innovation and adapting resource cycles, that support urban farmers (Gajjar, 2020).

Case-study inquiries, or funded research are considered crucial in understanding the situation across different urban farming communities in Cape Town in order to devise specific responses (Kanosvamhira, 2019). The secondary benefits and associated challenges of trust-building need greater policy attention. Thus, knowledge about the collaboration between farmers and supporting organizations will inform inclusive urban

initiatives (Kanosvamhira, 2019). Further knowledge of the UA practices, and their adaptation to the constraints of the lockdown, and the opportunities yielded through them, will be important for future policy formulation and governance design.

There is a marked difference in the framing of benefits which are generated through UA, among state officials and cultivators (social and personal) (Battersby and Marshak, 2013). This difference impacts the approaches taken by state actors when engaging with UA from a policy and practice perspective, and determines the way in which community farmers engage with each other and are supported by NGOs and civil society organizations (CSOs), who serve as intermediaries across formal institutions and informal networks. Kanosvamhira (2019) also cites current agrarian approaches to food and nutrition security, that perpetuate South Africa's colonial and apartheid legacy, as well as land tenure, which poses a problem for landless urban farmers, to coalesce, relocate and be forced to rebuild social networks, when they move, as significant challenges, which prevent the potential of UA from being realized. Approaches such as food sensitive planning and urban design, enabled through the implementation of the SPLUMA for instance, could help in alleviating the challenges linked to land access, allocation, and tenure, in the context of pro-poor urban farming.

DISCUSSION

Based on the IAD framework, a set of governance factors that shape urban agriculture initiatives and their potential contribution to local adaptation have been identified for three cities in Sub-Saharan Africa; Tamale, Kampala, and Cape Town. Similar to many Sub-Saharan African countries, Ghana and Uganda have complex land tenure systems. At the city level, the implementation of land-use and spatial planning regulations, and the ability of authorities to enforce regulations, is poor. These factors have pushed UA to the margins of the law, where it is both tolerated and common. But these same factors have also created space for more powerful dynamics, including land commodification and privatization of customary land. UA is unable to compete with more profitable land uses and, consequently, farmers are relegated to occupy marginal lands for production. The establishment of farm plots in public areas, often buffer zones around water sources, such as wetlands and riverbanks, increases farmers' climate-related vulnerability, such as increased risk of flooding. Adding to this, the lack of secure land prevents farmers from investing in technology and inputs for agricultural production.

In all case studies, a lack of effective coordination among supporting actors is a fundamental barrier to the development of UA. Many challenges arose in Cape Town due to unavoidable bureaucratic regulations between the public sector and civil society. These challenges concerned farm producers' difficulties in connecting to public institutions to access services such as land for cultivation and access to markets (Olivier and Heinecken, 2017). The role of NGOs in the UA sector is found to be significant in all case studies, connecting farmers to markets and several government departments and providing training and ongoing capacity development. In the context of Tamale, Bellwood-Howard et al. (2018) recommend forming an agricultural committee of the metropolitan assembly which would host an expert group to analyze the consequences of various food system planning decisions, such as those involving agricultural land and water.

Several authors support the claim that the nature and dynamics between urban formal and informal economies, their relationship with formal governance structures, as well as the variety of planning and governance capacities shaping urban agriculture in Sub Saharan Africa need to be considered in parallel and that processes around UA development need to involve all relevant actors (Cohen and Garrett, 2010; Weldegebriel and Prowse, 2013; Eakin et al., 2014; Lemos et al., 2016; Schwan and Yu, 2018).

Healey (1997) proposed *collaborative planning* as a way in which planning institutions, processes and decisions can be reshaped to deal with a multitude of cultural and political communities. In a collaborative model of planning and policymaking, stakeholders with diverging interest can coevolve to a common understanding where they can learn from each other. Key governance stakeholders must engage in collaborative procedures to collaboratively create and implement new strategies that address a broader variety of interests and demands (Innes and Booher, 2000). This could be supported by the creation of institutions responsible for coordinating among the different sectors, e.g., ministry/departments of agriculture, water, health, land-use, poverty alleviation, (horizontal coordination) and for cutting across different levels, i.e., national, regional and local governments (vertical coordination). It is critical to take into account the various actors involved in food security governance. CSOs, for example, can contribute bottom-up knowledge to the policy-making process in order to identify food security issues and locally relevant solutions (Candel, 2014). Existing relations with community members, due to long-term association and presence, as well as proximity to (awareness of) local challenges and past experiences in addressing them, are some of the strengths that CSOs bring to the process of collaborative planning.

A learning from the cases is that *collaborative governance* is particularly relevant for UA in Sub-Saharan Africa as it shows a pathway for local governments to work alongside informal residents and workers, and women's organizations in particular, to achieve sustainable outcomes, over longer timeframes. Transdisciplinary initiatives involving researchers, farmers, government officials, the corporate sector, and others can aid in the identification of UA action-research themes relating to new technologies, techniques and approaches to address adaptation needs (Sabiiti et al., 2014).

A limitation of our methodology for exploring these case studies is its reliance on secondary sources rather than interviews with local officials and other stakeholders or other participatory methods of data collection, which would have given representation of local voices and a more updated perspective on the contemporary state of affairs in urban agriculture in the cities. However, this approach of reviewing existing literature was chosen given the exploratory context of this

study. Few cities were eligible for our analysis, due to the limited and incomplete information available on the institutional characteristics shaping UA in Sub-Saharan African cities. As a consequence, the results of this study cannot be extrapolated and generalized to all Sub-Saharan African cities. It does, however, provide the framework for developing a common cross-city perspective to unpack governance factors that support or inhibit urban agriculture to achieve greater food security in urban areas.

CONCLUSION

Based on the IAD framework, a set of governance factors that shape urban agriculture initiatives and their potential contribution to local adaptation through enhanced food security, livelihood diversification and increased resilience to shocks and crises have been identified for three cities in Sub-Saharan Africa; Tamale, Kampala and Cape Town. The analysis of the case studies showed factors that compromise the ability of UA to contribute to climate change adaptation effectively. These factors often emerge from the interactions between urban development planning, land tenure systems and food security.

Our case studies emphasized the complexity of the nexus between formal and informal land systems, spatial development, and their effect on UA. In all three cities, urban agriculture is playing a significant role in food security as well as in mitigating the impact of climate change and variability. These benefits have been recognized by a wide range of stakeholders. However, due to increased pressure on land and competition between sectors, UA in these cities faces challenges to develop, maintain or even to formalize.

Our analysis points to weak implementation of land-use and land-use planning regulations and a limited ability of authorities to enforce rules in place in Tamale, Kampala, and to a lesser degree Cape Town. Weak formal land-use governance has driven UA to the legal outskirts, where its practice is both accepted and common.

A significant challenge in the establishment of UA found in all case studies is the lack of effective coordination of initiatives among supporting actors. In all case studies, NGOs play an important role in the UA sector, connecting farmers to markets and various government offices, as well as providing training and continuous capacity development.

Collaborative governance is especially important for UA in Sub-Saharan Africa because it demonstrates how local governments can cooperate with informal residents and workers, particularly women's organizations, to achieve long-term sustainability. Last, the findings of this study are not intended to be extrapolated to all cities in Sub-Saharan Africa, but they do provide a foundation for the development of a shared cross-city perspective on the governance factors that support or inhibit UA to attain higher food security in urban areas.

AUTHOR CONTRIBUTIONS

CV specifically covered the international literature review on climate risks, adaptation and links with food security, and reviewed the three cases. MV, AS, and SG wrote the three case studies drawing on existing literature on urban agriculture and food security and governance arrangements in the specific cities. MV recommended and supported the authors in applying the IAD framework to capture and communicate different aspects of the cases, also through the schematic. MV, CV, and AP reviewed and consolidated the whole manuscript. All authors contributed to the article and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fsufs.2021.692167/full#supplementary-material

REFERENCES

Abdul-Halim, A., and Abdul-Ganiyu, S. (2014). *Food Production Systems in the Tamale metropolis and Sagnarigu district in Northern Ghana*. Report commissioned by URBANET.

Akaateba, M. A. (2018). *Urban planning practice under neo-customary land tenure: the interface between government agencies and traditional authorities in peri-urban Ghana* [Master Thesis]. Technischen Universität Berlin.

Ayambire, R. A. (2019). A review of practices for sustaining urban and peri-urban agriculture_ Implications for land use planning in rapidly urbanising Ghanaian cities. *Land Use Policy* 18, 260–267. doi: 10.1016/j.landusepol.2019.03.004

Ayerakwa, H. M., Dzanku, F. M., and Sarpong, D. B. (2020). The geography of agriculture participation and food security in a small and a medium-sized city in Ghana. *Agric. Food Econ.* 8, 1–21. doi: 10.1186/s40100-020-00155-3

Baharoglu, D., and Kessides, C. (2001). *Urban poverty*. Poverty Reduction Strategy Paper (PRSP) Sourcebook.

Bartlett, S. (2008). Climate change and urban children: impacts and implications for adaptation in low-and middle-income countries. *Environ. Urban.* 20, 501–519. doi: 10.1177/0956247808096125

Battersby, J., and Marshak, M. (2013). "Growing communities: Integrating the social and economic benefits of urban agriculture in Cape Town," in *Urban Forum* (New York, NY: Springer), 447–461.

Battersby, S. E., Mitchell, J. T., and Cutter, S. L. (2011). Development of an online hazards atlas to improve disaster awareness. *Int. Res. Geograph. Environ. Educ.* 20, 297–308. doi: 10.1080/10382046.2011.619807

Bellwood-Howard, I., Chimsi, E., Abdul-Ganiyu, S., van Veenhuizen, R., and Amoah, P. (2015a). *Urban and Peri-urban Agriculture in Tamale: A policy narrative*. Ghana: Tamale.

Bellwood-Howard, I., Kranjac-Berisavljevic, G., Nchanji, E., Shakya, M., and van Veenhuizen, R. (2018). "Participatory planning for food production at city scale: Experiences from stakeholder disalogue process in tamale, Northern Ghana," in *Integrating Food into Urban Planning*, eds Y. Cabannes and C. Marocchino (UCL Press and FAO). 292-311.

Bellwood-Howard, I., van Veenhuizen, R., and Rashid, Z. (2015b). *City Strategic Agenda on Urban and Peri-Urban Agriculture—DRAFT—Tamale*.

Bidandi, F., and Williams, J. J. (2020). Understanding urban land, politics and planning: A critical appraisal of Kampala's urban sprawl. *Cities* 106:102858. doi: 10.1016/j.cities.2020.102858

Brown, D., and McGranahan, G. (2016). The urban informal economy, local inclusion and achieving a global green transformation. *Habitat Int.* 53, 97–105. doi: 10.1016/j.habitatint.2015.11.002

Cabannes, Y., and Marocchino, C. (2018). *Integrating Food into Urban Planning*. London: UCL Press.

Candel, J. J. (2014). Food security governance: a systematic literature review. *Food Sec.* 6, 585–601. doi: 10.1007/s12571-014-0364-2

City of Cape Town (2007). *Urban Agriculture Policy City of Cape Town*. Cape Town.

City of Cape Town (2013). *Food Gardens Policy in Support of Poverty Alleviation and Reduction (Policy Number 12399C)*. Cape Town.

COGTA (2020). *Profile: City of Cape Town. Department of Co-operative Governance and Traditional Affairs, Republic of South Africa*. Availabble online at: https://www.cogta.gov.za/ddm/wp-content/uploads/2020/11/City-of-CT-September-2020.pdf (accessed on May 20, 2021)

Cohen, M. J., and Garrett, J. L. (2010). The food price crisis and urban food (in) security. *Environ. Urban.* 22, 467–482. doi: 10.1177/0956247810380375

Crush, J., and Frayne, B. (2014). "Feeding African cities: The growing challenge of urban food insecurity," in *Africa's Urban Revolution*, eds S. Parnell and E. Pieterse (New York, NY: Zed Books), 110–132.

Crush, J., Frayne, B., and Haysom, G. (2020). *Handbook on Urban Food Security in the Global South*. Cheltenham: Edward Elgar Publishing.

Crush, J., Frayne, B., and Pendleton, W. (2012). The crisis of food insecurity in African cities. *J. Hunger Environ. Nutri.* 7, 271–292. doi: 10.1080/19320248.2012.702448

Crush, J., Hovorka, A., and Tevera, D. (2011). Food security in Southern African cities: The place of urban agriculture. *Prog. Develop. Stud.* 11, 285–305. doi: 10.1177/146499341001100402

Crush, J., and Riley, L. (2018). Rural bias and urban food security. *Urban Food Syst. Gov. Pover. Afric. Cities* 42, 42–54. doi: 10.4324/9781315191195-3

Davies, J., Hannah, C., Guido, Z., Zimmer, A., McCann, L., Battersby, J., et al. (2020). Barriers to urban agriculture in Sub-Saharan Africa. *Food Policy* 101999. doi: 10.1016/j.foodpol.2020.101999

Douglas, I., Alam, K., Maghenda, M., Mcdonnell, Y., McLean, L., and Campbell, J. (2008). Unjust waters: climate change, flooding and the urban poor in Africa. *Environ. Urban.* 20, 187–205. doi: 10.1177/0956247808089156

Eakin, H. C., Lemos, M. C., and Nelson, D. R. (2014). Differentiating capacities as a means to sustainable climate change adaptation. *Glob. Environ. Change* 27, 1–8. doi: 10.1016/j.gloenvcha.2014.04.013

Edwin, D. A., Glover, E. K., and Glover, E. K. (2020). When tradition meets modernity in land registration: evidence from Dagbon, Ghana. *Land* 9:416. doi: 10.3390/land9110416

FAO (2020). *Cities and Local Governments at the Forefront in Building Inclusive and Resilient Food Systems: Key Results from the FAO Survey "Urban Food Systems and COVID-19"*. Rome: FAO.

Filippini, R., Mazzocchi, C., and Corsi, S. (2019). The contribution of Urban Food Policies toward food security in developing and developed countries: a network analysis approach. *Sustain. Cities Soc.* 47:101506. doi: 10.1016/j.scs.2019.101506

Frayne, B., McCordic, C., and Shilomboleni, H. (2016). "The mythology of urban agriculture," in *Rapid urbanisation, urban food deserts and food security in Africa* (New York, NY: Springer), 19–31.

Fuseini, I. (2016). *Urban governance and spatial planning for sustainable urban development in Tamale, Ghana* [Doctor of Philosophy, Stellenbosch University]. Available online at: https://core.ac.uk/download/pdf/188224726.pdf

Fuseini, I., Yaro, J. A., and Yiran, G. A. (2017). City profile: Tamale, Ghana. *Cities* 60, 64–74. doi: 10.1016/j.cities.2016.07.010

Gajjar, S. P. (2020). Cape Town, South Africa: Urban Farming on the rise to boost people's food security. Voices from the Frontline. *International Centre for Climate Change and Development* (Posted on 14 December, 2020).

Gbadegesin, A., and Olajiire-Ajayi, B. (2020). Beyond COVID-19: Turning Crisis to Opportunity in Nigeria through Urban Agriculture. *J. Agric. Food Syst. Commun. Develop.* 9, 171–174. doi: 10.5304/jafscd.2020.094.033

Ghana Statistical Service (2013). *2010 Population and Housing Census*. Accra: National analytical report.

Global Clearing House for Development Finance (2020). *Finance Roadmaps for Climate Projects: How can Local Governments for Sub-Saharan Africa facilitate access to finance*. Brussels: Covenant of Mayors in Sub-Saharan Africa (CoM SSA).

Gyasi, E. A., Fosu, M., Kranjac-Berisavljevic, G., Mensah, A. M., Obeng, F., Yiran, G. A. B., et al. (2014). *Building urban resilience assessing urban and Peri-urban agriculture in Tamale*. Ghana: United Nations Environment Programme (UNEP).

Haysom, G., Battersby, J., and Park-Ross, R. (2020). "Food Sensitive Planning and Urban Design: *A Blueprint for a Future South African City?" (October 2020)*. SA: Food Security.

Healey, P. (1997). *Collaborative planning: Shaping places in fragmented societies*. New York, NY: Macmillan International Higher Education.

Heikkila, T., and Andersson, K. (2018). Policy design and the added-value of the institutional analysis development framework. *Policy Polit.* 46, 309–324. doi: 10.1332/030557318X15230060131727

Iaquinta, D. L., and Drescher, A. W. (2002). "Food security in cities–A new challenge to development," in *WIT Transactions on Ecology and the Environment,* 54.

Ilieva, R. T. (2016). *Urban food planning: Seeds of transition in the global north*. New York, NY: Routledge.

Innes, J. E., and Booher, D. E. (2000). Collaborative Dialogue as a Policy Making Strategy. *Working Paper 200005*. Berkeley, CA: University of California; Institute of Urban and Regional Development.

IUDF (2016). *Integrated Urban Development Framework*. Department of Co-operative Governance and Traditional Affairs, Republic of South Africa.

Kampala Capital City Authority (KCCA). (2019). *Statistical abstract for Kampala city*. Kampala: Kampala Capital City Authority. Available online at: https://www.kcca.go.ug/media/docs/Statistical-Abstract-2019.pdf

Kampala Capital City Authority (KCCA). (2020). *Kampala Capital City Strategic Plan 2020/21 to 2024/25*. Kampala, Uganda: Kampala Capital City Authority. https://www.kcca.go.ug/uDocs/Kampa-City-Strategic-Plan-2020-2025.pdf

Kanosvamhira, T. P. (2019). The organisation of urban agriculture in Cape Town, South Africa: A social capital perspective. *Develop. Southern Africa* 36, 283–294. doi: 10.1080/0376835X.2018.1456910

Kayaga, S. M., Amankwaa, E. F., Gough, K. V., Wilby, R. L., Abarike, M. A., Codjoe, S. N. A., et al. (2021). Cities and extreme weather events: impacts of flooding and extreme heat on water and electricity services in Ghana. *Environ. Urban.* 33, 131–150. doi: 10.1177/0956247820952030

Kriewald, S., Pradhan, P., Costa, L., Ros, A. G. C., and Kropp, J. P. (2019). Hungry cities: how local food self-sufficiency relates to climate change, diets, and urbanisation. *Environ. Res. Lett.* 14:094007. doi: 10.1088/1748-9326/ab2d56

Kumar, R., Mishra, V., Buzan, J., Kumar, R., Shindell, D., and Huber, M. (2017). Dominant control of agriculture and irrigation on urban heat island in India. *Sci. Rep.* 7, 1–10. doi: 10.1038/s41598-017-14213-2

Kuusaana, E. D., and Eledi, J. A. (2015). As the city grows, where do the farmers go? Understanding peri-urbanization and food systems in ghana—evidence from the tamale metropolis. *Urban Forum.* 26, 443–465. doi: 10.1007/s12132-015-9260-x

Land Use and Planning Act (2016) (Act 925), 106 (2016). Available online at: https://housingfinanceafrica.org/app/uploads/2021/03/Land-Use-and-Spatial-Planning-Act-2016-ACT-925.pdf

Lemos, M. C., Lo, Y. J., Nelson, D. R., Eakin, H., and Bedran-Martins, A. M. (2016). Linking development to climate adaptation: Leveraging generic and specific capacities to reduce vulnerability to drought in NE Brazil. *Glob. Environ. Change* 39, 170–179. doi: 10.1016/j.gloenvcha.2016.05.001

Lin, B. B., Philpott, S. M., and Jha, S. (2015). The future of urban agriculture and biodiversity-ecosystem services: challenges and next steps. *Basic Appl. Ecol.* 16, 189–201. doi: 10.1016/j.baae.2015.01.005

Lwasa, S., Mugagga, F., Wahab, B., Simon, D., Connors, J., and Griffith, C. (2014). Urban and peri-urban agriculture and forestry: transcending poverty alleviation to climate change mitigation and adaptation. *Urban Clim.* 7, 92–106. doi: 10.1016/j.uclim.2013.10.007

Lwasa, S., Mugagga, F., Wahab, B., Simon, D., Connors, J. P., and Griffith, C. (2015). A meta-analysis of urban and peri-urban agriculture and forestry in mediating climate change. *Curr. Opin. Environ. Sustain.* 13, 68–73. doi: 10.1016/j.cosust.2015.02.003

Lwasa, S., Wahab, B., Mugagga, F., Simon, D., Fragkias, M., Griffith, C., et al. (2011). The role of urban and peri-urban agriculture in enhancing food security and climate change resilience in East and West African cities. *Final project report for 2011 START grants for global change research in Africa*.

Mbow, C., Rosenzweig, C., Barioni, L. G., Benton, T. G., Herrero, M., Krishnapillai, M., et al. (2019). *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food* security, *and greenhouse gas fluxes in terrestrial ecosystems*. Geneva: IPPC.

Ministry of Land, Housing and Urban Development (2017). *The Uganda National Urban Policy*. Kampala, Uganda: Ministry of Lands, housing and urban development. Available online at: http://extwprlegs1.fao.org/docs/pdf/uga195928.pdf

Ministry of Land, Housing and Urban Development (2017). *The Uganda National Urban Policy*. Ministry of Lands, housing and urban development, Kampala, Uganda. Available online at: http://extwprlegs1.fao.org/docs/pdf/uga195928.pdf

Mugisa, I. O., Fungo, B., Adur, S. O., Ssemalulu, O., Molly, A., Atim, J., et al. (2017). Urban and peri-urban crop farming in Central Uganda: characteristics, constraints and opportunities for household food security and income. *African J. Plant Sci.* 11, 264–275. doi: 10.5897/AJPS2016.1477

Mwesigye, F., and Barungi, M. (2021). *Land Tenure Insecurity, Fragmentation and Crop Choice: Evidence from Uganda*. Nairobi, Kenya: African Economic Research Consortium. Available online at: http://publication.aercafricalibrary.org/bitstream/handle/123456789/1964/Research%20Paper%20419.pdf?sequence=1andisAllowed=y

Nchanji, E. B. (2018). Governance in urban and peri-urban vegetable farming in Tamale, Northern Ghana. *Land Use Policy* 75, 203–213. doi: 10.1016/j.landusepol.2018.01.011

Nchanji, E. B., Bellwood-Howard, I., Schareika, N., Chagomoka, T., Schlesinger, J., Axel, D., et al. (2017). Assessing the sustainability of vegetable production practices in northern Ghana. *Int. J. Agric. Sustain.* 15, 321–337. doi: 10.1080/14735903.2017.1312796

Olivier, D. W. (2019). Urban agriculture promotes sustainable livelihoods in Cape Town. *Dev. South. Afr.* 36, 17–32. doi: 10.1080/0376835X.2018.1456907

Olivier, D. W., and Heinecken, L. (2017). The personal and social benefits of urban agriculture experienced by cultivators on the Cape Flats. *Dev. South. Afr.* 34, 168–181. doi: 10.1080/0376835X.2016.1259988

Ostrom, E. (2005). *Understanding Institutional Diversity*. Princeton, NJ: Princeton University Press.

Ostrom, E. (2011). Background on the institutional analysis and development framework. *Policy Stud. J.* 39:7–27. doi: 10.1111/j.1541-0072.2010.00394.x

Ostrom, E., and Polski, M. M. (1999). "An institutional framework for policy analysis and design," in *Elinor Ostrom and the Bloomington School of Political Economy: A Framework for Policy Analysis*, eds D. H. Cole, M. D. DHA (Lanham, Md: Lexington Books), *pp* 13–47

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

Paganini, N., and Schelchen, A. (2018). "*Urban Agriculture in Cape Town and Maputo*," in *Urban Agriculture's role for Sustainable Urban Food Systems —a regional characterization and early evidence*. New York, NY: SLE Briefing.

Poku-Boansi, M. (2021). Multi-stakeholder involvement in urban land use planning in the Ejisu Municipality, Ghana: An application of the social complexities' theory. *Land Use Policy* 103:105315. doi: 10.1016/j.landusepol.2021.105315

Polski, M. M., and Ostrom, E. (n.d.). *An Institutional Framework for Policy Analysis and Design*, 35.

Prain, G., Karanja, N., and Lee-Smith, D. (2010). *African Urban Harvest: Agriculture in the cities of Cameroon, Kenya and Uganda*. New York, NY: Springer.

Revi, A., Satterthwaite, D. E., Aragón-Durand, F., Corfee-Morlot, J., Kiunsi, R. B., Pelling, M., et al. (2017). "Urban areas," in *Climate change 2014–Impacts, adaptation and vulnerability: Regional aspects*. eds C. B. Field and V. R. Barros (Washington, DC: Cambridge University Press), 24–33.

Ruhweza, A (2020). How Can Innovations in Urban Agriculture Strengthen Africa Food System and Deliver Benefit for Nature and the Environment. *Commission on Sustainable Agriculture Intensification (CoSAI). October 2020* Available online at: https://wle.cgiar.org/cosai/news/how-can-innovations-urban-agriculture-strengthen-africa%E2%80%99s-food-systems-and-deliver-benefits (accessed May 20, 2021).

Sabiiti, E. N., Katongole, C. B., Katuromunda, S., Sengendo, H., Basalirwa, C. P., Atukunda, G., et al. (2014). *Assessing Urban and peri-urban Agriculture in Kampala, Uganda*. Uganda: Building Urban Resilience.

Satterthwaite, D., Archer, D., Colenbrander, S., Dodman, D., Hardoy, J., and Patel, S. (2018). *Responding to Climate Change in Cities and in Their Informal Settlements and Economies*. Edmonton: International Institute for Environment and Development.

Schwan, S., and Yu, X. (2018). Social protection as a strategy to address climate-induced migration. *Int. J. Clim. Change Strateg. Manag.* 10, 43–64. doi: 10.1108/IJCCSM-01-2017-0019

Shannon, M., Otsuki, K., Zoomers, A., and Kaag, M. (2020). On whose land is the city to be built? Farmers, donors and the urban land question in Beira city, Mozambique. *Urban Stud.* 58, 733–749. doi: 10.1177/0042098020929237

Siegner, A., Sowerwine, J., and Acey, C. (2018). Does urban agriculture improve food security? Examining the nexus of food access and distribution of urban produced foods in the United States: a systematic review. *Sustainability* 10:2988. doi: 10.3390/su10092988

Smith, P., Nkem, J., Calvin, K., Campbell, D., Cherubini, F., Grassi, G., et al. (2019). "Interlinkages between desertification, land degradation, food security and greenhouse gas fluxes: synergies, trade-offs and integrated response options," In: *Climate Change and Land: an IPCC Special Report on Climate Change, Desertification, Land degradation, Sustainable land Management, Food Security, and Greenhouse Gas fluxes in Terrestrial Ecosystems,* eds P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.- O. Portner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley (Geneva: IPCC), 122.

Smits, W. (2018). "Urban governance in Africa: an overview," in *African cities and the development conundrum,* 55–77. doi: 10.1163/9789004387942_004

Sonday, N. (2019). *Peri-Urban Agriculture and Food Security in a Changing Climate: A View from Cape Town. Perspectives*. Berlin: Henrich Boll Stiftung.

Swilling, M., Gcanga, A., and Boraine, A. (2019). "Ramaphosa's New Dawn is here—but what it will take to bring the civil service back to life?" Op Ed on *Daily Maverick 30 May, 2019*. Available online at: https://www.dailymaverick.co.za/article/2019-05-30-ramaphosas-new-dawn-is-here-but-what-it-will-take-to-bring-the-civil-service-back-to-life/ (accessed April 24, 2021).

Tacoli, C. (2013). "Urban poverty, food security and climate change," in *IIED Briefing Paper-International Institute for Environment and Development*, 17149.

Tsilini, V., Papantoniou, S., Kolokotsa, D. D., and Maria, E. A. (2015). Urban gardens as a solution to energy poverty and urban heat island. *Sustain. Cities Soc.* 14, 323–333. doi: 10.1016/j.scs.2014.08.006

UN-DESA (2019). *World Population Prospects*. United Nations Department of Economic and Social Affairs. Populations Division.

UNISDR. (2009). *Making Disaster Risk Reduction Gender Sensitive*: *Policy and Practical Guidelines*. United Nations.

UNISDR. (2011). Revealing Risk, Redefining Development, Global Assessment Report on Disaster Risk Reduction. *United Nations Strategy for Disaster Reduction,* 17–51.

Vermeiren, K., Adiyia, B., Loopmans, M., Tumwine, F. R., and Van Rompaey, A. (2013). Will urban farming survive the growth of African cities: a case-study in Kampala (Uganda)? *Land Use Policy* 35, 40–49. doi: 10.1016/j.landusepol.2013.04.012

Weldegebriel, Z. B., and Prowse, M. (2013). Climate-change adaptation in Ethiopia: to what extent does social protection influence livelihood diversification? *Develop. Policy Rev.* 31, 35–56. doi: 10.1111/dpr.12038

White, S., and Hamm, M. W. (2014). Urban agriculture and a planning approach to urban food systems. *Center Report Series*, 4.

Wilby, R. L., and Keenan, R. (2012). Adapting to flood risk under climate change. *Prog. Physic. Geograph.* 36, 348–378. doi: 10.1177/0309133312438908

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