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Urban Agriculture in Yaounde and Environs: What Benefits for City Dwellers?

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Abstract. Urban agriculture constitutes a primordial booster against food insecurity, malnutrition and poverty the world over. The world's population is in a process of 'urban change' where a greater proportion of the population lives in towns and cities. In sub-Saharan Africa (SSA), a majority of the population stricken by socio-political crisis resides in towns and cities. In Yaounde-Cameroon, the increasing population driven by poverty and socio-political crisis resides in inaccessible and vulnerable urban spaces. The population living in these urban spaces are poor and vulnerable to food insecurity, malnutrition and poverty; and the need for sustenance and survival remains critical. This vulnerable population spends more of their disposable incomes on food items. To circumvent expenses on food and boost their economic situation, this vulnerable population has taken to urban agriculture. This study adapted quantitative and qualitative methods of data collection, questionnaire administration, oral history, interviews, informal discussions, focus group discussions and field observations to investigate and analyse the benefits of urban agriculture on urban dwellers in Yaounde city. The study was carried out in some selected communities of the seven municipalities of Yaounde and environs in the Centre Region of Cameroon. Results reveal that urban agriculture has both economic, household food security and nutrition, social, and environmental benefits. Findings equally show that the poor, women and socio-political migrants from within the country and neighbouring countries, with limited incentives for agricultural developments are involved in urban agriculture for sustenance. Plots stresses were observed to accentuate with financial hardship, and those commonly used were vacant and rented lands and those found along streams and rivers stuffed with urban wastes.

Keywords: urban agriculture, urban change, benefits, urban dwellers, Yaounde-Cameroon

Introduction

There is an increasing consensus that Urban Agriculture (UA) or Urban Farming (UF) is fast becoming an important source of alternative income and household food security especially in poor countries with over-crowded cities (UNDP 1996). One seventh of the world's food supply is grown in cities by approximately 800 million urban farmers (UNDP, 1986; Allen, 1999: 123) and contributes to urban household food security and income. A greater proportion of city dwellers are the poor and vulnerable to food insecurity, malnutrition and financial hardship. According to the population estimates of the United Nations, the world's population will reach 9.6 billion people by 2050 with a greater proportion of the growth occurring in urban centres of developing countries (UN, 2013; Magnusson *et al*., 2014; Mvo, 2016). This growth as projected by (FAO, 2012; Magnusson *et al*., 2014; Mvo, 2016) pointed out that SSA alone constitutes the highest growth rate as the urban population keeps expanding faster and will double between 2010 and 2030. At the turn of the 20th century, Annez *et al.,* (2009) avouched that only 15% of the world's population lived in cities and half of this population will live in urban areas at the end of 2008 (UN-HABITAT, 2008) with a projection to attain 66% by the year 2050 (UN-HABITAT, 2016). Recently, the global proportion of people living in urban areas stands at 56.2% (UN, 2020). Following studies carried out in Cameroon by Kamga *et al*. (2014), projection shows that the population in cities will increase and 2 out of 3 Cameroonians will live in cities by 2030 (Mvo, 2016). According to the World Bank estimates, approximately 49% (7.4 million) of the total population in Cameroon is urban considering it a highly urbanised country by SSA

standards with an average annual urban growth rate of 4.1% (WB, 2002). Studies carried out by Plecher (2020) show a progressive increase in the growth rate of urbanization since 2009 till 2019. It revealed that in the year 2009, there were 50.95% and through the years, it stood at 56.97% in 2019. In 2018, the total population of Yaounde was 3656000 people, then 3822000 people in 2019 and in 2020; it stood at 3992411 inhabitants with a growth rate of 4.45% (UN, 2020). According to studies carried out in Yaounde by Lebga *et al.* (2018), Yaounde experienced an increase in a horizontal urbanization in 2016 from 40074.79ha to 43774.21ha in 2018 with 65% of the urban population living in slums with an increasing rate of slum dwellers of 5.5% (UN-HABITAT, 2016). This is as a result of the influx of socio-political war victims from within and out of the country. The growing intensity of Internally Displaced Persons (IDPs) from the North West and South West, Far North and East Regions of the country as well as Central Africans due to the socio-political upheavals has increased the population of Yaounde. It will be unrealistic to believe that this rapid population growth will not pose deleterious effects on food security and economic hardship in the city contending them. It is, therefore, a truism that this population will in tend demand for more food supplies for survival whereas the land available for food crop cultivation is neither proportionate nor increasing to tie with the increasing demands of the population. Thus, food insecurity, malnutrition and financial hardship will continue to reign supreme for especially the poor and the socio-political refugees residing in the city. Considering the difficulty in supplying and distributing food from rural areas to cities due to increasing transport costs and the difficulty in production, it is therefore believed that food insecurity will continue to rise especially in the cities (Argenti, 2000) if concrete measures are not taken. In order to circumvent the situation, these urban dwellers found solace in UA, making it inevitable to ameliorate food supplies, thus, fighting food insecurity and malnutrition as well as reducing poverty. The increasing tendency of UA in the city of Yaounde is to address food insecurity, malnutrition and financial hardship. This has been made possible due to the close proximity of the farms to the urban markets where the harvested crops reach consumers in their fresh conditions. It complements rural agriculture and increases the efficiency of the national food system (IDRC, 1998) as it provides products that rural agriculture cannot supply easily due to their perishability and the poor state of rural roads.

According to the United States Department Report on Human Rights in Cameroon (2008), about 9000 refugees entered into Yaounde from the Northern regions in 2008 and conservative figures from local monitoring agencies estimated that about 5000 homes in a dozen of towns and cities were demolished. This rendered the inhabitants homeless as about 25000 businesses were also uprooted in a process termed urban rehabilitation since 2005. In recent times, these agencies also estimated that more than 45000 persons from the North West and South West regions of Cameroon escaping from the socio-political crisis are now residing in Yaounde. In a study carried out by Fon Nsoh (2011), the state failed in its duty to protect women, the young, the elderly and the disabled as well as to provide social services as prescribed by the constitution. As a result, these poor masses are left with no choice than to adapt to other forms of activities such as UA for sustenance. Urban agriculture has generally been correlated positively with household food and incomes with a broader spectrum in poverty reduction, household wealth, and livelihood sustenance (Cheema *et al.*, 1996). According to Largerkvist (2011), Magnusson and Berger (2014), and Mvo (2016), it depicts a social phenomenon practiced in time and space. It is an all-round easy entrepreneurial activity for people at different levels of income and livelihood sustenance which can be related with its diverse categories by complexity of farming systems, types of crops cultivated, purpose of farming, location of farm and type of plots used as well as those involved in the activity (Sawio, 1993; Maxwell, 1995; UNDP, 1996; Drescher, 1996). Although considered as a multi-faceted phenomenon involving several categories of farmers, vis-à-vis sex, food

security and income levels, UA in Yaounde is mostly carried out at the peripheries and within the city on small plots which are either family owned, rented plots, vacant or idle plots, along roadsides and around streams and rivers usually stuffed with urban wastes. These urban plots usually suffer illegal dumping of wastes, and are liable to stinky dirty stagnant water with potential dangerous and health threatening effects as insinuated by Black (1995). Notwithstanding the nature of these vacant plots used for agriculture, most city dwellers have not relent their efforts, making their living worth appreciating from them, though with very limited incomes and knowledge of such soil-plots decontamination.

Urban agriculture refers to the intensive cultivation of crops and the raising of animals for income generation, food security and other uses within and around cities and towns (De bon *et al.*, 2010) to sustain livelihoods in urban areas. This term has been considered diversely by different researchers on its meaning. To some, it is an oxymoron**,** marginal, a constructive recreational activity or an aesthetic function that helps to beautify the ugly city, often perceived as archaic, temporary and inappropriate (UNDP, 1996). In the same connection, the Urban Agriculture Network (1996) has defined urban agriculture as an industry that produces, processes, and markets food, fuel, and other outputs largely in response to the daily demand of consumers within a town, city, regardless of farm size and number of human resources involved (Rezai *et al*., 2016). It includes aspects of environmental health, remediation, and recreation (Butler & Moronek, 2002). In this study, UA includes the cultivation of crops, flowers/agro-forestry and poultry farming within the city of Yaounde and environs with direct effects on household food security and nutrition, poverty reduction or economic viability, social integration and environmental resilience. The role that urban agriculture plays in improving livelihoods through household food security by closing the deficit gap is primordial (Smith *et al*., 1996; Binns & Lynch, 1998; Monkiedje *et al*., 2006; Mvo, 2016). Its importance cannot be overemphasised especially in Central and West Africa with rapid urbanisation and limited agriculture infrastructural incentives to boost production (Endamana *et al*., 2003; Mvo, 2016) as well as rising socio-political crisis. Because it is multi-beneficial with regard to the environment, food security and nutrition and wealth, most urban dwellers especially low income earners, socio-political migrants and the poor are enormously eking a living out of it. In a rapidly urbanising city such as Yaounde in Cameroon, the possibility that its dwellers depend on their ingenuity to provide the necessary food needs and incomes for their survival remain critical. Freedom from hunger among the poor city dwellers and the socio-political refugees in the city of Yaounde can only be enjoyed if they are food and financially secured, an assertion averred by Kruger *et al*. (2008) that freedom from hunger is the most fundamental human rights.

Location of Study Area

This paper focuses on urban agriculture in Yaounde city and environs, and its benefits to city dwellers. Yaounde is located at latitude $3^0$44’0”N-$3^0$52’12”N of the equator and longitude $11^0$25’0”E-$11^0$35’0”E meridian in the Mfoundi Division of the Centre Region of Cameroon (Figure 1).

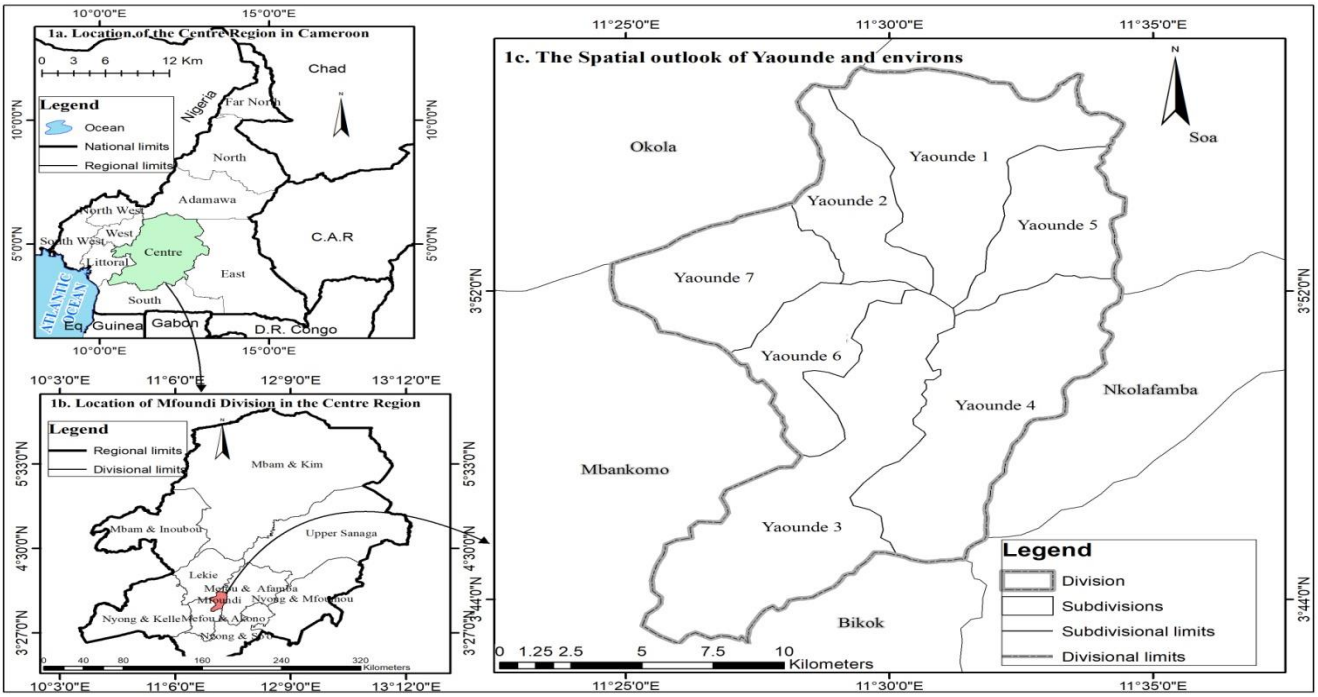

Figure 1a: Location of the Centre Region in Cameroon; Figure 1b: Location of Mfoundi Division in the Centre Region of Cameroon; Figure 1c: The spatial outlook of Yaounde and environs

Figure 1: Location of Yaounde in Mfoundi Division in the Centre Region of Cameroon
Source: Adapted from the 2007 administrative map of Cameroon

The Yaounde municipality has undergone urban explosion in time and space. In 1956, the total land area of Yaounde covered 1740ha, to 3807ha in 1980, and in 2007, it covered 15919ha. As population keeps increasing, its need for land also increases. In 2001, the total land was 25900ha and covers an area of 30000ha in 2011. This city has undergone a horizontal urbanization from 40074.79 in 2016 to 43774.21ha in 2018 (Lebga *et al*., 2018). It is estimated that it will cover an area of 65000ha in 2025 (Yaounde City Council, 2010). The Yaounde municipality is composed of seven council areas which are Yaounde I, II, III, IV V, VI, and VII (Figure 2).

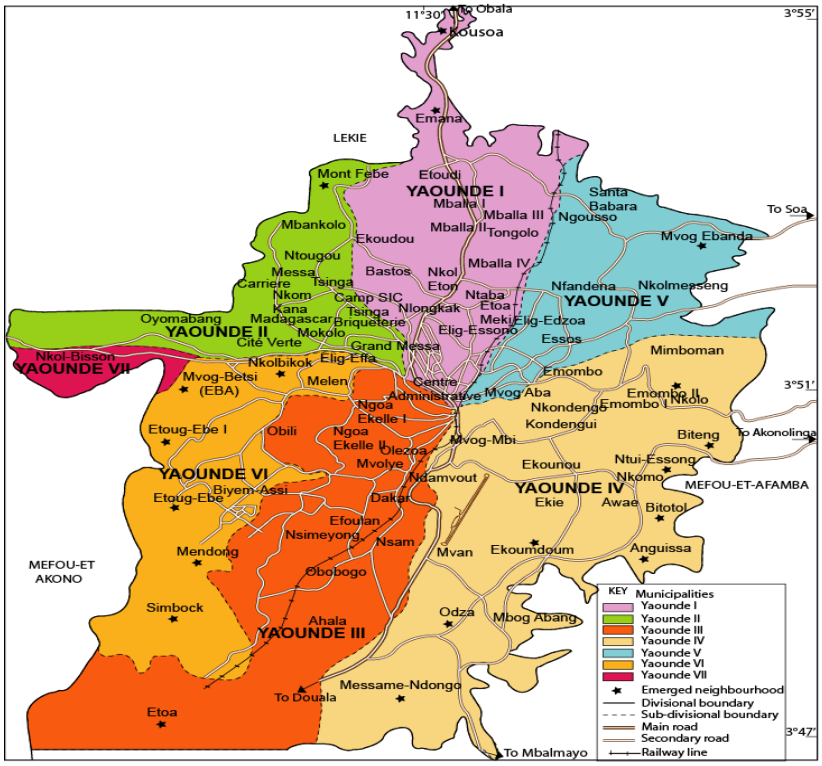

Figure 2: Yaounde and its seven council areas and environs

Source: Adapted from the 2007 administrative map of Cameroon using Google Earth image data for 1990 and 2016 with assistance from experts in the National Institute of Cartography and the 7 Yaounde Municipalities

The population of Yaounde is cosmopolitan and according to the 2005 population and household census sheet, the population stood at 1881876 inhabitants distributed within the seven municipalities as follows: Yaounde I (281586), Yaounde II (238927), Yaounde III (245314), Yaounde IV (477350), Yaounde V (265087), Yaounde VI (268428) and Yaounde VII (97997) inhabitants with the present estimate at 4164167 inhabitants in 2021 (Yaounde City Council, 2016, 2021). Bearing in mind that the population has increased by 2282291 inhabitants since 2005, it has been projected to reach 6682000 inhabitants by 2035 according to world population statistics (UN, WB, 2020). From these statistics, one can judge the level of food scarcity and poverty especially among the poor and socio-political refugees of recent residing in the city. This study relied on the premise that urban agriculture in the city of Yaounde and environs is visible in the cultivation of food crops, horticulture and poultry farming for sustenance, thus, enhancing household food security and providing nutritious food, generating household income, and improving livelihoods and environmental resilience in the city. This could be a booster to the attainment of the Millennium Development Goals 1 and 2 aimed at eradicating extreme poverty and hunger respectively as had expected by the UN in the year 2015, and Cameroon attaining emergence in 2035.

The Problem

Food, health, shelter, financial viability and a sustainable environment are some of the basic human needs as enshrined in the Millennium Development Goals of the United Nations. The importance of food cannot be overemphasised as it encompasses better growth, good health and survival. Freedom from hunger among the poor city dwellers and the socio-political refugees in the city of Yaounde can only be enjoyed if they are food and financially secured, an assertion averred by Kruger *et al.* (2008). The poor and the socio-political

refugees resident in Yaounde city face difficulty accessing food and finances to meet their daily needs for survival. This is because such group of people neither have quick access to food and land nor own land in their destination area. This makes them desperate and thus, causes them to initiate coping strategies for survival. This study, therefore, sets out to provide answers to the following research questions: What are the coping strategies adopted by the city dwellers of Yaounde and its environs, and of what benefits are these coping strategies?

Literature Review

The many idle lands present in Yaounde ranging from backyards to unoccupied lands and wetlands perpetuated by urban sprawl have encouraged the poor and crisis-stricken migrants to valorise it for income generation and food security. According to Grewal and Grewal (2011), cities can produce enough food on a smaller and manageable land which could prevent expenditure of income on fresh food resources using hydroponic or indoor factory production. City farmers in Yaounde with insufficient means to practice indoor factory or rooftop food production keep managing the idle, vacant and peripheral lands mostly with organic manure (cow dung, household wastes, and fowl droppings with limited inorganic products). Many authors have dwelt on UA diversely with authors such as Cheema *et al.* (1996), Grewal *et al.* (2011) on economic aspects of UA, Wakefield *et al.* (2007), Audate *et al.* (2018) on food security and nutrition, FAO (1999), Rickman *et al.* (2007) on social justice or integration and Butler and Moronek (2002), and Boeing (2016) on the environment. Country authors include Essougong (2017) on urban and peri-urban agriculture in Cameroon, status and perspectives for development, and Lebga, Simone, and Yemmafouo (2018) on peri-urban dynamics in Yaounde town and its environs. The extent to which urban livelihood is enhanced by UA is indeterminable until accurate data is collected, treated and analysed in a way to come out with casualties. It is therefore the objective of this paper to come out with facts capable enough to establish a correlation existing between urban agriculture and the livelihood benefits to Yaounde city dwellers.

Methodology

The study adopted quantitative and qualitative methods of data collection based on a review of existing literature. Data for this paper were gleaned from oral history, focus group discussions and the responses of respondents acquired through questionnaire administration at the level of households. Three focus group discussions were organised comprising of both males and females in Yaounde III, VI and VII due to the high level of UA practices. A total of 200 respondents provided answers to the questionnaire while six interviews comprising of four refugees involved in UA, one native of Yaounde I was interviewed to obtain useful information on land acquisition issues and the shared benefits of UA; one oral historic source in Yaounde II were conducted in farms and households that masterminded and practiced urban agriculture in Yaounde. Informal discussions enabled the researcher to gather more insightful information on UA in relation to the poor residents as well as socio-political refugees in Yaounde. Observations were part of this exercise to determine the agricultural activities practiced so as to review secondary sources on the subject. Inferential statistical techniques were used for data treatment and the results obtained were presented in the form of tables and percentages. Photographs were obtained through on-the-spot observations for visual geography. Some sites in the Yaounde seven municipalities and environs were selected at random through balloting from each of the municipalities. From Yaounde I, (Emana, Nkolmbong and Mballa II) were selected while (Cite Vert, Tsinga I and Madagascar) were selected from Yaounde II. Yaounde III were (Ngoa-Ekelle, Ahala and Nsimeyong I), Yaounde IV (Nkomo I, Biteng and Odza), Yaounde V (Essos, Ngousso I and Nkolmeseng II), Yaounde VI (Etoug-Ebe, Simbock and Mvog-Betsi) and Yaounde VII (Nkolbison and

Abobo). Some areas of the Yaounde environs were Soa, Bikok, Nkolafamba and Okola. These sites were selected to represent Yaounde city and environs on UA in relation to the poor residents and refugees coping strategies for survival.

Results and Discussion

The continuous influx of socio-political refugees into the city of Yaounde since the year 2016 till present, coupled with the worsening economic condition in the country have led to an uncontrolled settlement and occupation of idle lands. This occupation of idle lands is mainly for agricultural purposes as a coping strategy for survival. Some of these idle lands are state owned such as the idle land around the presidency used by poor urban residents and the socio-political refugees for food crop cultivation. Field work revealed that 60% of those involved in UA come from the Anglophone Regions, 30% from the Far North and Central African Republic while 10% come from the West Region. The idle and wetlands around Ngoa-Ekelle and Emana are mostly occupied by both the Anglophones, Bamilekes and war refugees from Central African Republic and the Northerners escaping from the Boko Haram resurgence. These idle lands that range from backyard to vacant lands are exploited by these poor residents and refugees for sustenance. Since the year 1951 to 2018, the city of Yaounde has witnessed a horizontal increase in vacant land exploitation, both by settlement and UA (Figures 3 and 4).

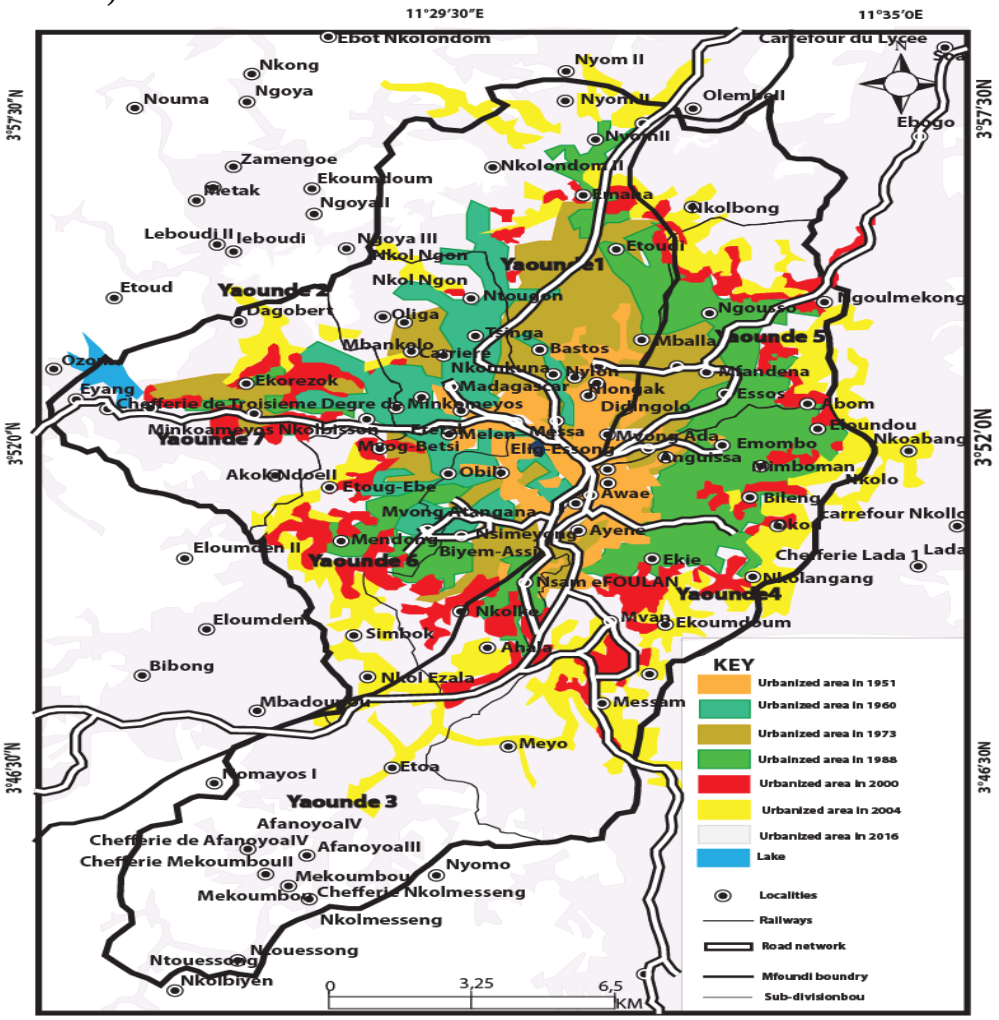

Figure 3: Evolution of vacant land exploitation in Yaounde since 1951-2016

Source: Adapted from the 2007 Administrative map of Cameroon using Google Earth image data for 1990 and 2016 with assistance from experts in the National Institute of Cartography and the 7 Yaounde Municipalities

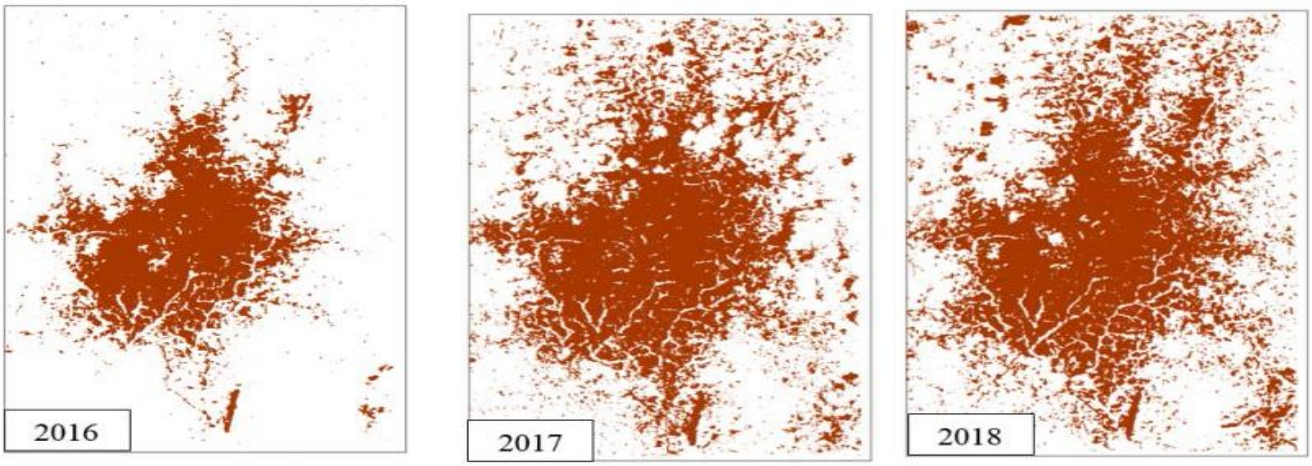

Figure 4: Yaounde Spatial Peri-Urban Evolution from 2016-2018
Source: Sentinel satellite images 2016-2018 (adopted from Lebga *et al.*, 2018)

In 2016, settlement was concentrated within the city of Yaounde with little extension into its peripheries. With the increasing number of city residents and the socio-political migrants into the city for safety, the settlement started extending beyond the bounds of the city into its environs in 2017 and which continued densely in 2018 and is still undergoing extension till presently. The progressive occupation of land for settlement within the city and its peripheries in 2021 has forced many urban farmers (the poor and refugees) to occupy idle and vacant lands further into the peripheries, encroaching into other municipalities as well as the constricted central places around thwarted wetlands of the city for agriculture. Since these refugees are financially unviable to purchase plots for farming and settlement and as well, having very little hope to permanently stay in Yaounde, they seek refuge in these vacant lands for sustenance most often temporarily. Remote sensing data obtained through Multispectral Imager (MSI) from the European Space Agency (ESA) for two periods shows the evolution of vacant land (land use/cover) over time and space in Yaounde (Tables 1 and 2). Table 2 indicates that agriculture dropped in the centre of the city towards the peripheries from 2016-2021 while forest also dropped within same period. While degraded forest regenerated within 2016-2021, bare surfaces increased within same period and built up areas also increased. The increase of agriculture towards to peripheries is due to the increased built up areas that has consumed cultivable lands, thus, forcing the poor residents and refugees further into the outskirts of the city (Figure 5). Agricultural activities increased in 2021 than it was in 2016 when the socio-political crisis started intensifying. The regeneration of the degraded forest is as a result of government policy, laying emphasis on environmental resilience. Figure 5 shows diminishing inner city agricultural activities though with mostly horticulture and agro-forestry for beautification and environmental resilience. The more population increases in a city characterised by economic hardship, food inaccessibility and unavailability, and uncontrolled settlement, the more it gives room for the exploitation of idle lands and backyard spaces as well as the creation of slums and squatter settlements.

Table 1. Remote sensing data used in the study

Platform	Sensor	Resolution (m)	Acquisition date	Source
Sentinel-2	MSI	10	2016/03/08	ESA
Sentinel-2	MSI	10	2021/01/27	ESA

Source: Multispectral Imager, European Space Agency for the period 2016-2021

Table 2. Land cover/use changes (2016-2021)

Land cover/use	2016	2021
Agriculture	5900.83	5606.83
Forest	4931.02	5424.89
Degraded forest	1721.15	3792.09
Bare surfaces	395.51	544.97
Built-up	12613.91	13448.33
Cloud	3254.69	-
Total	**28817.11**	**28817.11**

Source: Multispectral Imager, European Space Agency for the period 2016-2021

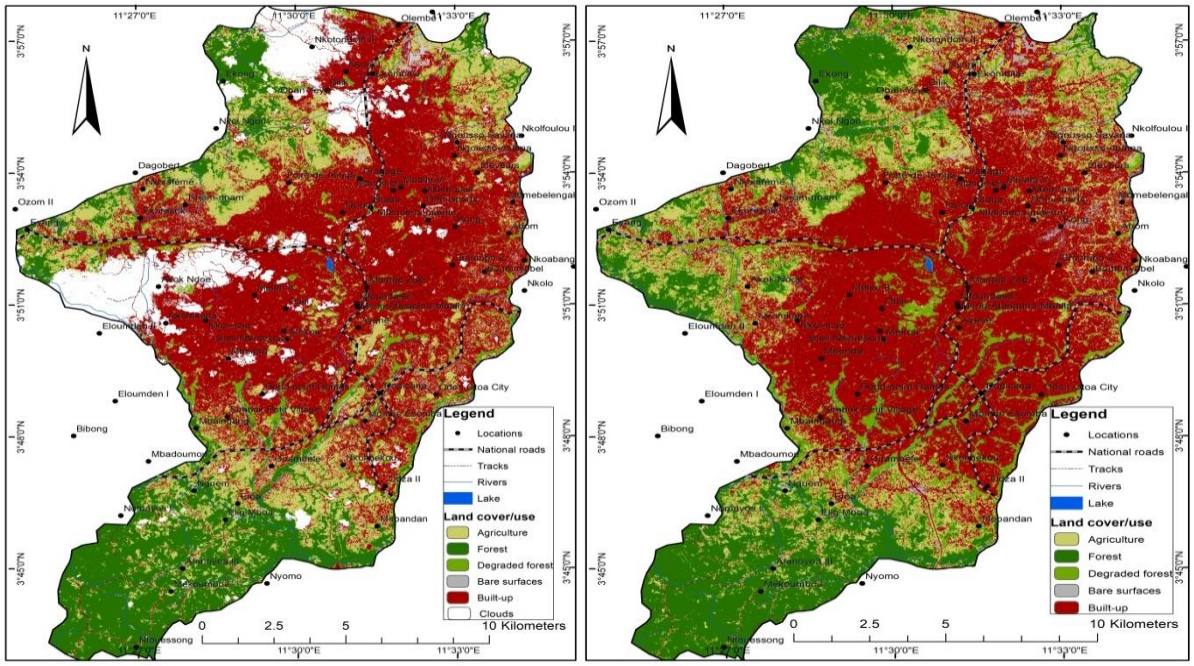

Figure 5: Land cover/use in 2016-2021 showing the spatial distribution of UA within the city of Yaounde

Source: Multispectral Imager, European Space Agency for the period 2016-2021

Benefits of UA in the City of Yaounde and Environs

Urban agriculture in the city of Yaounde is beneficial to city dwellers in four ways (household food security and nutrition, economic viability, social integration and environmental resilience) through the practices of food crop farming, horticulture/agro-forestry and poultry faming. These practices have enabled the socio-political vulnerable and poor population in the city of Yaounde to improve their living standards by reducing poverty and hunger, achieving food security, improving nutrition and ensuring healthy lives and wellbeing in households as enshrined in the UN Millennium Development Goals 1, 2 and 3 respectively.

Urban Household Food Security and Nutrition

It is a truism that UA contributes to urban household food supplies and good health. The cultivation of diverse crops ranging from cereals, vegetables and fruits are visible enough to enormously make food supplies easier and cheaper for those city dwellers involved in urban agriculture in particular and the entire urban population of Yaounde city. A majority of those involved in this practice are the poor, socio-political refugees escaping into the city of Yaounde with very limited incentives for agro-practices and are most stricken by the

difficulty with which they access food resources and finances for their survival. Due to the fact that most city dwellers living in inaccessible urban spaces are not able to generate sufficient income opportunities be it through formal or informal channels to adequately, reliably and regularly access food, they see urban agriculture as the sole means for sustenance. Inadequate income among poor urban dwellers translates more directly into food insecurity than those in the rural areas; due to the need of money to purchase the different food needs than in the rural areas where the foods are harvested. In Yaounde, the land is intensively used and soil managed mostly with organic manure such as fowl droppings from poultry farms, cow dung, and soil collected from around waste can depots that have undergone decomposition as well as household wastes, making use of streams and rivers usually stocked with urban wastes. This is to enable the soil fertile and moist for the cultivation of diverse crops. This activity is practiced all year round. During the dry season, it is carried out in the marshy areas and around streams and rivers while during the rainy season, it is done in most idle land ranging from residential sites to far-off settled areas. These plots most often do not exceed $300m^2$ around residential areas and can be above in off residential areas. During the dry season, mostly crops of shorter cycles and of high value such as vegetables and legumes are cultivated usually along stuffed urban streams. Main crops cultivated include cereals (maize, beans and groundnuts), tubers (cassava, cocoyam, sweet potatoes), and vegetables (okra, huckleberry, biter leaves, tomatoes, garden eggs, lettuce, pepper and other green leafy vegetables) and fruits such as pineapples. A variety of these crops are available in the various households throughout the year, thus, enhancing food security and eradicating malnutrition.

The rankings of farming types in the study area depend on the importance attached to it by the farmers and the benefits they obtain depending on their various motives (Table 3). Table 3 shows that food crop cultivation ranks first followed by horticulture and lastly, poultry farming. Concerning food crop cultivation, vegetables rank first with 60%, tubers come second with 42% and cereals come last with 41%. Generally, vegetables occupy the first and second positions with 60% and 45%, more than tubers with 42%. The high proportion in vegetables cultivation rests on its high nutritious value for households with vitamins and fibres which are necessary for human health and huge income generation. The high proportion of farmers, 33% cultivating vegetables for household food security and nutrition and 40% for economic reasons against 15% and 12% for social and environmental reasons respectively is indicative of the dire need of food and income for the various households.

The production of vegetables in poor households have positively impacted on members' health and especially those of children, eliminating sicknesses related to anaemia, kwashiorkor, constipation and indigestion as gathered from focus group discussions. Farmers had the perception that cultivating vegetables give them a larger latitude to consume more as they believe what they produce is of good quality as compared to what is bought from the market. With this perception, more of the vegetables are cultivated to close the scarcity gap and to improve healthy living standards in their households. Following a comparative study in the study area, it was noticed that those with high degree of vegetables intake at random each day was higher among urban farmers than non-farmers who depend solely on their purchase. Another reason for farmers cultivating vegetables is to provide variety and freshness as what arrives the market are expensive and in a stale state. Consuming the fresh vegetables give them the zeal for more cultivation and as an extra booster for balanced diets as it has been shown that a 5-10 days transportation and storage lag between production and consumption leads to losses of 30-50% in some nutritional constituents (Shewfelt, 1990a). In a study carried out by Faber *et al*. (2002) in developing countries described nutrition education programs that include home gardening components to balance diets and variously

boost serum retinol, vitamin A, iron, and iodine in rural South Africa, India, Bangladesh, Mexico, Indonesia and the Philippines and that it has been shown to boost micro-nutrient intake in countries.

Table 3. Ranking of crop types by importance and motives for farming in Yaounde city

Ranking / Crop type	1st		2nd		3rd		Motives for urban farming in Yaounde city							
	Nº	%	Nº	%	Nº	%	Food security/ nutrition		Social		Economic		Environ mental	
							Nº	%	Nº	%	Nº	%	Nº	%
Food crops														
Vegetables	120	**60**	90	**45**	32	16	66	33	30	15	80	40	24	12
Tubers	60	30	84	**42**	86	43	78	39	18	9	94	47	10	5
Cereals	20	10	26	13	82	**41**	70	35	21	10	100	50	09	4.5
Total	**200**	**33.3**	**200**	**33.3**	**200**	**33.3**	**212**	**36**	**69**	**11**	**274**	**46**	**43**	**7**
Horticulture														
Roses	116	**58**	56	28	28	14	-	-	20	10	160	80	20	10
Hibiscus, etc	54	27	86	**43**	60	30	-	-	35	17.5	140	70	25	12.5
Total	**170**	**42**	**142**	**36**	**88**	**22**	-	-	**55**	**13.75**	**300**	**75**	**45**	**11.25**
Poultry														
Table birds	140	70	39	19.5	21	10.5	30	15	21	10.5	149	74.5	-	-
Old layers	30	15	75	37.5	95	47.5	6	3	1	0.5	193	96.5	-	-
Total	**170**	**43**	**114**	**28.5**	**116**	**28.5**	**36**	**9**	**22**	**5.5**	**362**	**85.5**	-	-

Source: Field work, 2017-2018

Most of these common vegetables cultivated in the city of Yaounde are nursed in nurseries before they are being transplanted in the prepared plots. These are cultivated in all available spaces (Plate 1) around the residential areas including fenced balconies and far-off farms, most often, laden with waste deposited by runoff ranging from solid to liquid. Solid wastes such as tins, plastics, corrugated zinc sheets among others are sorted out and piled for burning or at times, heaped at strategic parts of the farm. Ridges are formed allowing space for dug out watering wells especially in the dry season in strategic portions suspected to be near the water table. Improvised watering cans ranging from plastic plates, cups, buckets to enamel dishes are made available for crop watering during the dry season. Fowl droppings are commonly used to enrich the soil. Simple tools such as cutlasses, hoes, knives and razor blades are used for clearing, tilling, weeding and harvesting of the vegetables respectively. Leafy vegetables are tied in bundles, ready for the market which at times is done in the farms, road sides and the market in their fresh state as they are seldom processed.

Photo 1: Various backyard and vacant parcels of land along a stream in the Nkozoa neighbourhood used for crop watering; a: Huckleberry, b: Stream, and c: Olembe Stadium under construction.

Photo 2: a: Pepper, and b: Pumpkin cultivated along a fenced house in Nkozoa neighbourhood

Plate 1: Vegetable cultivation in a transformed wetland and along a fence in Yaounde

Tubers and maize are highly cultivated. They are either planted on mounds or on the edges of ridges and in some cases; separate farms are cultivated (Plate 2). They provide efficient calorific energy due to their micro nutrients (carbohydrates) which releases energy as insinuated by a farmer.

Photo 3: a maize farm in anidle land in Nkozoa neighbourhood (a: maize farm, b: unplanned settlement)

Photo 4: crop farm in an idle land in Emana neighbourhood (a: cassava farm, b: cleared maize farm)

Plate 2: Food crops cultivation in idle lands and backyards

As gathered from field work, this vulnerable socio-political population revealed that these tubers serve as household food enhancer throughout the year, rescuing them from food scarcity. They also attract huge sums of money for other household exigencies. It is now very common to find young girls and boys moving about with trays on their heads containing boiled cassava, roasted maize, cocoyam, sweet potatoes and patched maize for sale. It is increasingly becoming difficult to find a heap of these tubers for 200FCFA as was common in the past. On the contrary, the quantity that was sold for 200FCFA is now being sold for 500FCFA; a price deemed expensive for non-urban farmers in the city. Urban farmers in tubers cultivation faced very little challenges consuming them as they could harvest them from their farms when need arises. Table 1 shows that 39% and 49% of the farmers cultivate tubers for food security and nutrition and economic motives respectively while 9% carry out the activity for social motives. Field work revealed that cereals as maize, groundnuts and beans are mostly cultivated. While groundnuts and beans are on the most part cultivated once a year, maize is cultivated in most places more than twice. Beans are cultivated mostly during the dry season in respect to the environmental dictates. The cultivated maize is harvested and sold fresh to city dwellers. A good proportion of it is either boiled or roasted and sold especially along the streets. Very limited proportion is harvested and sold in the dry state. As gathered from field informants, the fresh maize attracts huge sums of money than in the dry state. Most of the farmers cultivating maize were found in the 3rd rank category and contributes 35% to household food security and nutrition and beacons 50% of economic returns. Beans and groundnuts provide them with protein which is vital for growth. The groundnuts are also boiled, grilled and sold in every part of the city. Fresh groundnuts are sold throughout the year.

As shown on Table 3, no urban farmer carried out horticulture for household food security and nutrition. This is simply because they do not consume flowers but the income generated from the sales are used to purchase non garden crops or crops they could not easily obtain from their urban plots. Horticulture farmers were unanimous for economic reasons with 87.75% against social motives with 11.25%. Still on this table, table birds (white) are mainly raised than old layers (brown) and 9% of the farmers avouched raising it for household food security and nutrition. These old layers are raised mainly for the production of eggs while the older ones are released into the market for sale. They explained that the white table birds are cheaper to raise than the old layers though expensive, they beacon huge

sums of income through the sales of eggs. Unfortunately, they do not have huge capital to engage in this cumbersome activity.

Economic Viability (Poverty Reduction)

Well cultivated small plots can beacon surprising amounts of economic returns for urban poor dwellers via the cultivation and sales of harvested crops as it also saves household expenditures on food as growing own crops are profitable. Cultivating crops reduces the rate at which food is bought in the household. As gathered from field informants in Yaounde, UA forms a larger sustenance of the informal sector and employs mostly the poor, women, and Internally Displaced Persons (IDPs) (pers.comm. Ma Gladys, Yaounde, 2018). Documented data is rare as the sector is still unorganized and remains at the level of individual farmers. The farmers operate on informal bases as the activity receives no public financial assistance and therefore, remains invisible, but vividly clear in ameliorating livelihoods in poor households through household food security and economic returns. Field survey revealed that at least 150000-250000FCFA are obtained per year from the sales of crops, a situation similar to that sited by Sawio (1998) and the cash used for other household exigencies especially the payment of children's school fees, lodging and acquiring better accommodations and other lucrative training like motor mechanics, tailoring among others. It is worth noting that these farmers have very limited capital, a situation likened to small-scale enterprises in urban Kenya as stated by House *et al*. (1993) and as a result, only moderate quantities suitable for immediate evacuation are harvested and taken to the market or any other sales point. Common sales points are the farms, farm gates and roadsides. For instance a maize roadside roaster testified that she obtained a total amount of 115000FCFA in one season. Similar activities are carried out on road sides such as roasting cocoyams, sweet potatoes and as gathered from the field, these roasted food stuffs cost between 150-600FCFA depending on the size and type of roasted stuff. To support supply as a result of the increasing population, some of these food stuffs are obtained from Soa, Okola and Mbankomo, all at the outskirts of Yaounde.

Another increasing interest in UA in the city of Yaounde among farmers stems from the fact that urban farmers do not spend much on transporting, packaging, preserving and distributing as the products are sold directly to consumers either on the farms, farm gates, and roadsides usually in the open air. Because of less expenditure on product handling, more of the income generated remains with them than transporters and other agents along the production chain. This is because the farms by virtue are at close range with consumers whereby the products arrive them in the fresher and nutritious state thus, stimulating the poor farmer's economy. Most of the farmers have created links with other urban agents dealing in the collection of composting urban wastes and the fabrication of suited tools. In most households, the sales of cooked chicken and eggs in the urban centres especially around motor parks, farm gates, construction sites, the streets, and erected mobile fast foods stalls on wheelbarrows, trucks, motor-bikes and even vans are common.

Horticulture has provided enormous income to farmers. A variety of flowers are cultivated ranging from roses, different species of hibiscus, palms, pines, lantana, among others. This is mainly carried out along main streets in the city around *St Anasthasie, Carrefour Wada, Nouvelle Route Bastos,* Olezoa, 20th May Boulevard, around the Sport Complex, and other places (Plate 3).

Photos 5 and 6: Horticulture around the Yaounde Sport Complex with varied flower species for sale and for environmental beautification. Mature flowers in polythene bags ready for sales. The flowers are mostly nursed in polythene bags

Plate 3: Horticulture farm with a variety of flower species in Yaounde

As gathered from flower growers in the field, the main reason for the cultivation is for economic reasons as they eke out huge sums of money from their sales. This activity over the years has been gaining grounds in the city especially to the poor, IDPs and those who could not afford white collar jobs in the city. Field work revealed that a small bouquet of fresh flowers cost FCFA5000. The prices of seedlings range from 500-1500FCFA, depending on its age and species. The sales are mainly along the main streets and flower markets like those of the Central Market and around *Pharmacie de Soleil* in the central town. The marketing of these flowers has led to the creation of a veritable marketing system where even public agents seek for decorative flowers during occasions, funerals and best wishes gifts to their love ones. Non-flower markets are created where items such as flower vessels, jars, carriers and stands are displayed for sale (Plate 4) thus, creating other activities around flower farms and generating household income. This has led to job creation and business development. The waste left from the flowers after preparing decorative bouquets is collected for local composting in the farms or by *HYSACAM*, a clean-up company in the country for proper disposal. The marketing system involves middlemen as others cultivate, others harvest and sell, others carry to sales points while others decorate for delivery. This, notwithstanding, has generated income at all levels of the production chain.

Photos 7 and 8: Various flower jars, carriers and stands for sale, thus, attracting many buyers as well as beatifying the town.

Plate 4: Non-flower markets around flower farms in the city of Yaounde

The raising of poultry as indicated on Table 3 shows a high proportion of 85.5% for economic reasons with no environmental benefits. The selling of these birds either in the poultry farms, roadsides or the markets are on the rise. This is indicative of the dire need for

financial acquisition to handle other relevant household exigencies. The prices of the birds differ depending on their sizes and ages. For instance their prices range from 3000-8000FCFA and to an extent, 10000FCFA especially with the white table birds while the maximum price for the old layer stands at 3000FCFA. This is a simple reason why most farmers prefer the white table birds than the old layer thus, ranking it second when compared with white table birds. Eggs and fried chicken on sales are common in bars and restaurants which also serve as a means of attracting household income.

Social Integration

Urban agriculture is a functional stimulus to provide social security, integration and poverty alleviation among and within the poor city dwellers. The performance and exchange of different skills in urban agricultural activities have led to knowledge acquisition and a veritable societal build-up. This has been done through the promotion of sustainable development, thus, reducing urban vulnerability especially among the youth who would have spent time in criminality. The time bestowed in farming occupies these set of people and thus, reduces the rate of crimes which are common in most urban centres. Horticulture sites most especially have proven to be physical and psychological relaxation scenery for recreation. The *St Anasthasie* is fast becoming a recreational, educative and relaxation site especially on weekends and during ceremonies such as marriages and end of year festivities. Picnic and research teams visit the area for botanical research. Similar activities are undertaken at *Rond Point Nlongkak*, Central Post, Flyover Province and the Bastos Round about. It has become a normalcy to find people of all age groups especially during the end of year festivities, relaxing and having fun and snapshots around and within these areas. This is common with refugees from the Central African Republic who obtain self-esteem and usefulness through participatory entertainment programs. As gathered from the field, a majority of visitors in these horticultural sites are orphans, women, less privileged and socio-political refugees who could not find jobs to integrate themselves with the realities of the urban sphere to acquire a decent livelihood. Most of them have been integrated into pruning, watering, weeding, and picking up waste deposited around the area and in such doing, get involved in producing food, other valuable jobs that could be sold and attract money for their sustenance. From Table 3 and field work, it is noticed that urban agriculture plays a positive part in the social lives of urban dwellers with 11% from food crop production, 13.75% from horticulture and 5.5% from poultry farming. Summarily 30.25% of urban agriculture accounts for social inclusion of urban dwellers in the city. This is indicative of the fact that UA is not fundamental for food production per se, but also for social integration and recreation. The raising of poultry for occasional usage and the consumption of chicken gives the farmer a sense of belonging to a certain social class.

Environmental Resilience

The many wastes produced from urban livestock production coupled with increasing household wastes emanating from rapid urbanisation in Yaounde have tended to supplement inorganic fertilizers. Most farmers rely on these organic wastes because they are readily available and cheap as compared to inorganic fertilizers. The collection of slurry from sceptic pits, compost produced from public and household dustbins and urban livestock production reduce the quantity of waste that would have been abandoned within the city. This has gone a long way to limit the level and rate of environmental pollution. It was observed in the field that composting livestock and domestic wastes is not only assisting in urban waste management, but has also created a lucrative economic benefit to those involved in the business. The use of urban organic wastes for UA can be a good driver to substantially reduce waste water and organic solid wastes which in turn, also reduce vectors of disease such as

mosquitoes which breed in and around stinky stagnant water in pools and heaps of garbage thus, freeing the environment from the snare of a shanty city and also reducing the emissions of gases such as methane from dumpsites. UA enhances a sustainable environmental management system through waste reuse. Though waste disposal and management is fast becoming a serious up-hill task in the city of Yaounde, its recycling and reuse through composting is of great environmental benefit. It should be recalled that the use of fresh and untreated organic matter such as slurry from sceptic pits could be of serious health risks to the population. This is as a result of the fact that these farmers do not possess the knowledge to adequately treat the slurry and as well decontaminate the soil. This hurdle is further more challenged by the negligence of the state in issues of UA.

According to public authorities, UA occupies public space which results in poverty, urban landscape degradation, food contamination causing diseases from biological and chemical agents and insecurity with farms being suitable hideouts for criminals (Yemmafouo, 2014). This opinion of public authorities are proven wrong by the availability of and accessibility to fresh and save food for urban dwellers through good yields, both in quantity and quality. Though sceptical of food contamination as a result of untreated use of waste especially waste water for crop watering, consumers have adapted coping strategies in treating food stuffs before consumption. The use of salt or vinegar and clean water is gaining grounds among city dwellers of recent. Though, public authorities view UA as a potential threat of insecurity and criminality for the population, the clearing, cleaning and transforming of idle lands for farming have scared away criminals from such areas. The clearing and transforming of the idle land around the presidency for UA has reduced the high level of criminality that existed there. It should be noted that only 5% of the farmers acknowledged cultivating flowers for environmental motives. These are those who planted flowers as well as fruit trees around their homes for shelter, beautification and as a source of food and not just for environmental purposes. They expressed that while harvesting, consuming and selling their farm products, they must have contributed to climate change mitigation in their own meager way through the cultivation of green plants in the city. This is because the greenery of the environment helps in carbon dioxide sequestration.

Urban agriculture has increased idle land exploitation and consequently decreases informal dumpsites for wastes in the city. At the same time, these dumpsites act as crime and environmental ill-health problem sites. The clearing, cleaning and transforming such sites for farming could lead to the maintenance of buffer zones which could positively impact on the micro-climate through carbon-dioxide sequestration, provision of shades and moderation of the temperature, a process of environmental stabilisation where dust particles are absorbed by the green plants as well as reduce run-off. The transformation of dumpsites, marshy areas and derelict lands in Yaounde II around *Grand Messa*, *Cite Vert*, *Camp Yeyap* have created an environmental awareness with the population residence around those areas. This has also led to a common slogan known as ‘keep our municipality clean’, an exercise done every Wednesdays from morning to mid-day initiated by the then City Council Mayor (Tsimi Ovouna). In areas with horticulture, the beauty of the town is unique as it portrays a colourful, cool and refreshing environment attractive for picnics, leisure and other urban activities linked to relaxation and education (Plate 5). The beautiful and attractive flowers that produce nectar for insects especially the bee is of great importance for bee farming, though little is known about this exercise in the city of Yaounde.

Photos 9 and 10: horticulture and agro-forestry at the Main Entrance to the University of Yaounde I and St Anasthasie at *Carrefour Wada* respectively. Serves for the beautification of the city and creating a convincing environment for studies socialisation (marriage celebration), picnic, leisure and recreation.

Plate 5: Enabling environments for learning, leisure and recreation in Yaounde

As depicted on Table 3 and the perceptions of farmers gathered in a focus group discussion, practicing UA is mainly for household food security and income generation than social and environmental. It could be deduced that the 17.5% attributed for environmental benefits from UA is because farmers passively contribute to it. Their main aim is not directed to environmental benefits but nature holds it so. This is indicative of the insignificant proportion as compared to the proportions of household food security and nutrition and income generation. No farmer practiced poultry farming for environmental reasons rather fowl droppings tend to be an unfriendly environmental activity as it causes air pollution. Critically looking at the uses of fowl droppings, they are excellent for soil conservation and thus, good for vegetables cultivation. The relationship between UA and its benefits to the city and city dwellers of Yaounde is inter-related (Figure 6).

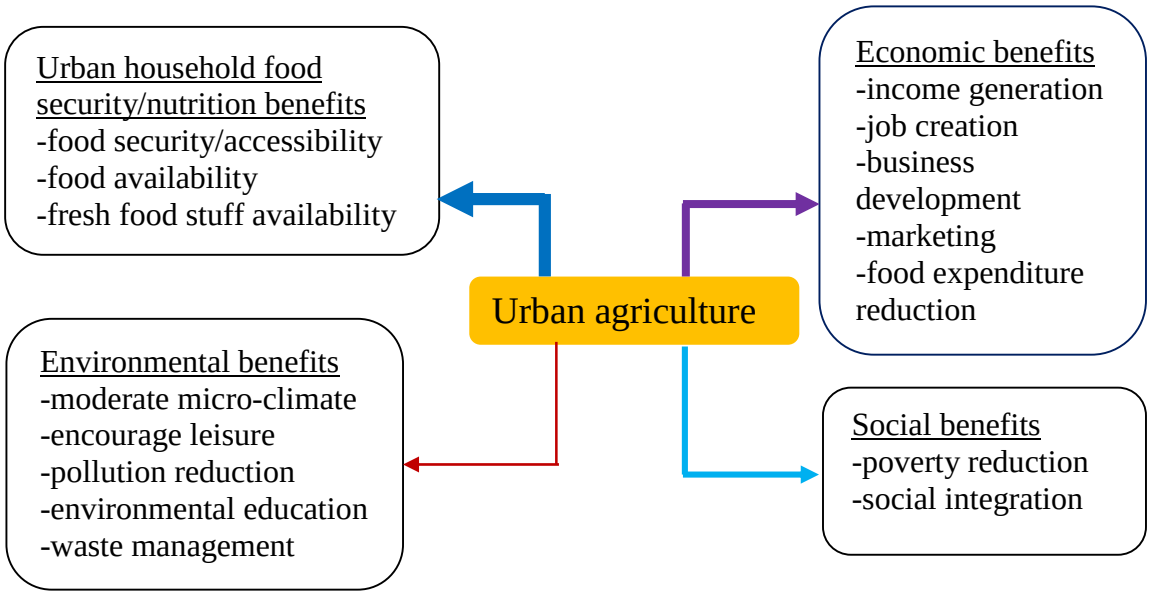

Figure 6: Diverse benefits of urban agriculture in Yaounde and environs
Source: Fieldwork and author's conception with inspiration from literature review, 2018

Conclusion

Farmers demonstrate various reasons for practicing UA, ranging from food security, economic, social and to an extent, environmental. This paper reveals that though UA is beneficial to the population, it is also beneficial to the environment passively as the farmers do not cultivate flowers purposely for the beautification of the environment or the city. They actively engaged in farming practices that yielded household food security and nutrition and generated income needed for household exigencies. The difficulty with which land is obtained and the importance embedded in the efforts to ameliorate livelihoods among the poor and IDPs in the city of Yaounde calls for an urgent intervention from the municipalities to provide assistance to them. This could be done through the provision of land, market, water, processing facilities and transportation as well as storage to promote and encourage the sector. The handling and usage of untreated waste water and the cultivation of crops in waste laden soils with little or no knowledge of soil decontamination is a call for concern. Municipalities can organize the sector and train farmers on adequate handling and irrigation methods (drip irrigation, and zero tillage) for safe production. This can also be done by ensuring the treatment of urban waste water through biological means at low costs for reuse. This will go a long way to sustainably manage urban waste water and thus, keep the environment clean and at the same time, encourage agriculture. The Yaounde seven municipalities can create market places for urban farmers in each of the municipalities to stimulate micro-enterprise development in relation to UA, thus, creating more avenue for revenue and food resources.

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