

*Full Length Research Paper*

# Urban agriculture in metropolitan Lagos: An inventory of potential land and water resources

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**The research examines how urban agriculture as an individual household micro level strategy can directly influence the financial empowerment of urban poor within the Lagos metropolis, positively. Using secondary data collected from government agencies (satellite image, hydrology map, statistical data etc) and primary data collected from field observation and reconnaissance survey; the paper takes inventory of potential land and water resources that can contribute to urban agriculture within Lagos metropolis. The research finds out that Lagos metropolis requires 18 times its present size (3,577 km<sup>2</sup>) to be able to feed her people on sustainable basis. It identifies 4,293 and 28,890 ha of potential land and water resources under the jurisdiction of Federal, State and private ownership, respectively. The paper recommends urban agriculture land use policies that will avoid clash between the interests of farmers and long term government land use goals. It concludes that such well articulated goals need to bear in mind the environmental impact of urban agriculture on the cityscape as well as its management on a sustainable basis such as the choice of crops and ideal number of farmers needed for land and water resources in the State.**

**Key words:** Food security, urban agriculture, urban planning, ecological footprint, ecological city (eco-city).

## INTRODUCTION

Sixty percent of the population of metropolitan Lagos falls within the poverty bracket while poor urban households spend about 90% of their meager monthly income on food.

One of the goals of the Earth Summit II (World Summit for Sustainable Development-WSSD) is to rescue one billion people from abject poverty. The most affected continent is Africa especially Sub Saharan Africa with twenty one of the thirty poorest nations of the World (Acquaym, 2000). Two hundred and ninety million Africans survive on less than one United States of America dollar a day (World Bank, 2000). According to FAO, (1996), the number of people that are unable to feed adequately is estimated to be 777 million people. This prompted the goal of the World Food Summit - to reduce by 50% the 1992 statistics of 815 million hungry people by the year 2015. However, recent situation in Sub Saharan Africa with about 190 million chronic undernourished people is worrisome (Osagie, 2002). That target may not be met. According to International

Food Policies Research Institute projection, by the year 2020, every third person in Sub Saharan Africa may lack food security (Population Report, 1997). The global concern in the last ten years is how to evolve appropriate model to eradicate poverty. At the plenary high-level segment of the WSSD, food security is identified as the first step towards global poverty eradication (Obasanjo, 2002). Food security as defined by World Bank (FAO, 1996) is "access by all people at all times to enough food for an active, healthy life". Food security related poverty is getting prominent in poor urban neighborhoods throughout Sub-Saharan Africa especially in highly populated countries like Nigeria.

Globally, an estimated 2.5 billion people live in cities. In Nigeria, 40% of the projected 150,000,000 population live in urban centers. Metropolitan Lagos is the most urbanized area of the nation with an average of 9% population growth rate (Lagos State Government Diary, 1992). The location of over 60% Nigeria's industrial and commercial establishments, international sea and airports, 70% of the nation's banking institutions, 90% of foreign trade and corporate headquarters of multinational corporations within the geographical area, attracts migrants from other parts of Nigeria in particular and

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other parts of the West African sub region in general. According to Ashiyanbi (2005), the projected population for Lagos State is 15,000,000. Ninety percent of this figure is concentrated in the metropolis giving an average population density of 500 people per hectare or 31 people per one standard plot (18 × 36 m). Over fifteen years of economic depression with the accompanying high unemployment and inflation rates had pushed 60% of the metropolitan population below the US\$1 poverty mark. Generally, expenditure on food takes a high percentage of urban household resources. Tansa (1996) observed that the poorest households spend up to 90% of their meager income on food. Governments and Developmental Agencies have adopted different strategies to eradicate the high spending on food items and the increasing malnutrition of urban poor. Strategies such as food subsidies, food stamps, school children and mother feeding programmes have been experimented in many nations of the world with very little success. One of the reasons for the poor performance of these household food security management strategies is because it operates on or uses the top to bottom or top-down approach. It is a non-participatory strategy that ignores the opinion of the beneficiaries. That is why Drescher (1996) stressed the need for an individual household micro level strategy. It is a strategy that directly influences the financial empowerment of individuals. Promoting farming in poor urban neighborhoods has been found to influence the economy of individual household positively, but this is hinged on the availability of productive land and water resources. This paper takes an inventory of potential land and water resources in metropolitan Lagos ideal for urban agriculture.

The inventory will enhance preparation of land use plan for purposeful urban farming policy and will provide practical parameters for the disbursement of micro credit facility in this era of poverty eradication. The paper adopts UNDP's (1996a) definition of urban agriculture which is synonymous to urban farming as 'an industry that produces, processes and markets food on land and water dispersed throughout urban and peri-urban areas'. UNDP (1996a) also referred to urban agriculture as 'an entrepreneurial activity for people from different levels of income'. For the poorest of the poor, it provides good access to food. For the stable poor, it provides a source of income and good quality food at low cost. For the middle-income families, it offers the possibility of savings and a return on their investment in urban property and for small and large scale entrepreneurs, it is a profitable business.

The range of urban agriculture is broad. It includes fish and other aquatic products grown in tanks; ponds and fish cage on sewage lagoons; poultry and rabbitery; orchards including street trees and vine yards, vegetables grown in small hydroponics solution, market garden on vacant city plots; and horticulture and vegetable farming on utilities' right of ways. It is an

international agricultural industry that produces processes and markets food to urban dwellers. According to People and Planet (2005), some 800 million city dwellers are involved in urban and peri-urban agriculture on a small or large scale. Collectively, they produce about 15% of the World's food. Singapore provides 25% of its vegetable and much of its fish. Hong-Kong produces 66% of the poultry and 50% of its vegetable. So important is urban farming to city food security that 25% of Kenya's urban population survives on it. In Buenos Aires, 20% of the city's nutritional needs come from this part time farming (UNDP, 1996b). Recent worldwide research works have shown that 65 and 80% of the inhabitants of Moscow and Kinshasa practice some forms of urban farming respectively. Ninety percent of vegetables supply to Shanghai and other Chinese towns and cities are produced by her inhabitants (Hardy et al., 1996). In the nation of Israel, 95% of food requirements are obtained from city farming (Freeman, 1996).

Statistical data on urban farming in Lagos is scanty but we observed that the population of urban farmers is on the increase. Urban farming in wider Lagos include poultry keeping; artisan fishing in coastal villages; roadside horticulturists; market gardens at flood plains; and free range herds on coastal grasslands of littoral local council areas. As stated by Hardy et al. (1996), most cities draw on rural areas within their regional setting for food resources. Metropolitan Lagos is a typical example. Unpublished research works have shown that the bulk of local poultry products, 'garri'; fruits and vegetables are from the South Western states of Nigeria especially Ogun, Oyo and Ondo states. Northern states in the North Eastern and North Western geo-political zones of Nigeria supply beef and mutton. A more glaring example is fish consumption in the metropolis. Studies by Ashiyanbi (2005) revealed the supply deficit of fish from local sources to be 158,266 m tons. This deficit encouraged massive importation of smoked fish from neighboring states and frozen fish from European countries. A State with 22% water surface area could not meet fish demand of her population! Rather, she draws food resources from hinterland at the detriment of rural dwellers. This undermines the capital base of the bioregion and subsequent productivity and sustainability of the present and future generations.

The concept which helps understanding of the impact of city's food requirements on the landscape is what Rees (1991) termed as "Ecological footprint". An ecological footprint is a measure of the impact that a given population exerts on nature. It represents the land area necessary to sustain current level of resource consumption and waste disposal of a specific population. According to People and planet (2005), city residents of the industrialized world consume much more than those in developing countries. At current consumption levels, a typical North American City with a population of 650,000 requires about 30,000 square kilometer (that is, ratio of

population to footprint area is 1:22) whereas, a similar city in India requires only about 2,800 km<sup>2</sup> (that is, ratio of population to footprint area is 1:232). Lagos with an estimated population of 15 million people requires an ecological footprint area of 23,077 square kilometers footprint area (that is, ratio of population to footprint area is 1:649) which is about 6 times the present area of the state (3,577 km<sup>2</sup>). This concept highlights the importance of ecological carrying capacity of human settlements. It endeavors to find out the natural resources demand of human settlements such as foodstuffs. Ecological footprint for urban food consumption is measured in areas of farmland required to feed city population. It also seeks to know the prevailing allocated agricultural land and noticed deficits.

Reducing such deficits require a sustainable urban planning policy that allows the use of vacant land resources and pollution free water bodies within the city for productive agriculture. It is a biocentric planning that places man as part of the living community of the ecosystem. This is what Berg (1998) refers to as bioregionalism. Downton (2003) observed that living bioregionally demands getting bulk of city's food supplies within the contextual ecosystem. This will minimize the city's capability to consume and degrade the natural capital of rural communities. Besides, the health of the supporting ecosystem will improve. Such bioregional city development approach is conscious of the fact that productive agricultural system and ecological development must be planned to support generations at any point in time. The concern for generational continuity in the usage of resources evolved the term "Sustainable Development". The reality of environmental sustainability was highlighted by the 1987 World Commission on Environment and Development (WCED, 1987). The report of this United Nations meeting at Stockholm referred to as our Common Future, reminded man to meet "the needs of the present generation without compromising the ability of future generation to meet their own needs". These needs are met by natural capital in the ecosystem. Sustainable development took the form of a global environment and development action plan (Agenda 21) signed by World Leaders at the United Nation Conference on Environment and Development (UN, 1992). Earth summit I outlined sustainable inputs for all human undertakings as a remediation measure to the wanton consumption of global resources that manifests in environmental degradation and impoverishment. The result was the adaptation of the principles of natural resources conservation by several U.N. initiatives.

The Istanbul convention (Habitat II) subscribed to the goals of sustainable development through the use of ecological variables to keep the well being of man continuously in urban centers (U.N, 1992). This arose from the understanding that when a natural ecosystem is altered to accommodate agglomeration of human habitat, an urban ecosystem is created. City's ecosystem is a

complex process in which specie *Homo sapiens* settles himself in a dense concentration. Simulating ecological process in planning and designing of human settlement is what Ryn et al. (1999) referred to as ecological design. It is the incorporation of the knowledge of how nature operates into city design process. Ecologically designed human settlement, (known as ecological city or eco-city), takes advantage of available energy resources. Energy in the ecosystem is transferred from creature to creature along food chain. Human settlements are kept alive by balanced functions of typical city living including housing, social life, entrepreneurial activities and food provision. Urban farming in ecological cities do not only supply appreciable quantity of city food needs but also enhances environmental aesthetics, contributes to efficient waste management and preserves natural resources especially urban forests and water resources.

In spite of the stated environmental, economic and nutritional benefits of urban agriculture; many city governments are reluctant to incorporate this sustainable food sourcing into their planning process. Freeman (1996) noted that government officials in the ministries of Health, Environment, Agriculture and Physical Planning in most developing nations view farms in cities as breeding grounds for mosquitoes, snakes and rodents. They also claim that the use of agricultural chemicals will further compound the already contaminated city soil and waterways. These socio cultural and institutional biases against urban farming are major constraints. Other obstacles encountered are organizational constraints; post production constraints, special risks of farming in the city and problems of access to resources especially capital, inputs and services. According to Kunze (1998), the most unprogressive challenge facing urban agriculture is the land tenure system. In Nigeria, the existing land use policy makes it rather difficult for poor urban farmers to access land resources. In the absence of friendly land use policy and plan that encourages urban farming; city farmers are subjected to harassment and subsequent eviction from even government lands. However, it is noteworthy that recent prevalence of high poverty indices in the metropolis has kept alive the Lagos State government's interest in urban farming as an urban poverty alleviation strategy. The major concern and constraint is access to urban land and water resources in the metropolis. This paper takes an inventory of potential land and water resources that can support productive farming in the city

## THE STUDY AREA

Lagos metropolis occupies the heart of Lagos State with the Atlantic seaboard as the southern boundary. The 30 km broad southern base along the Bight of Benin tapers northward and terminates at Agege at a distance of about 26 Km. It is framed by longitudes 2°42'E and 3°22'E of

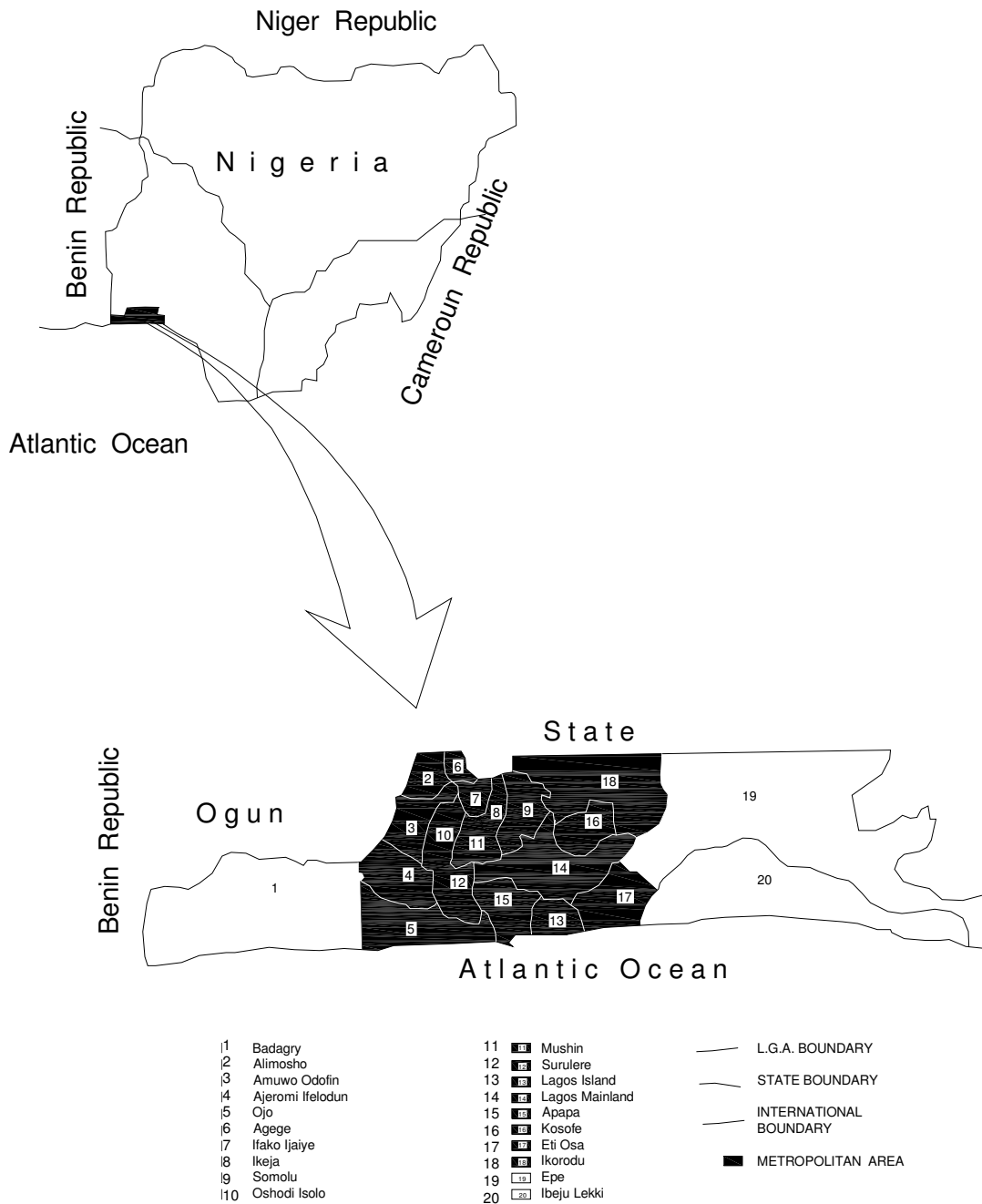
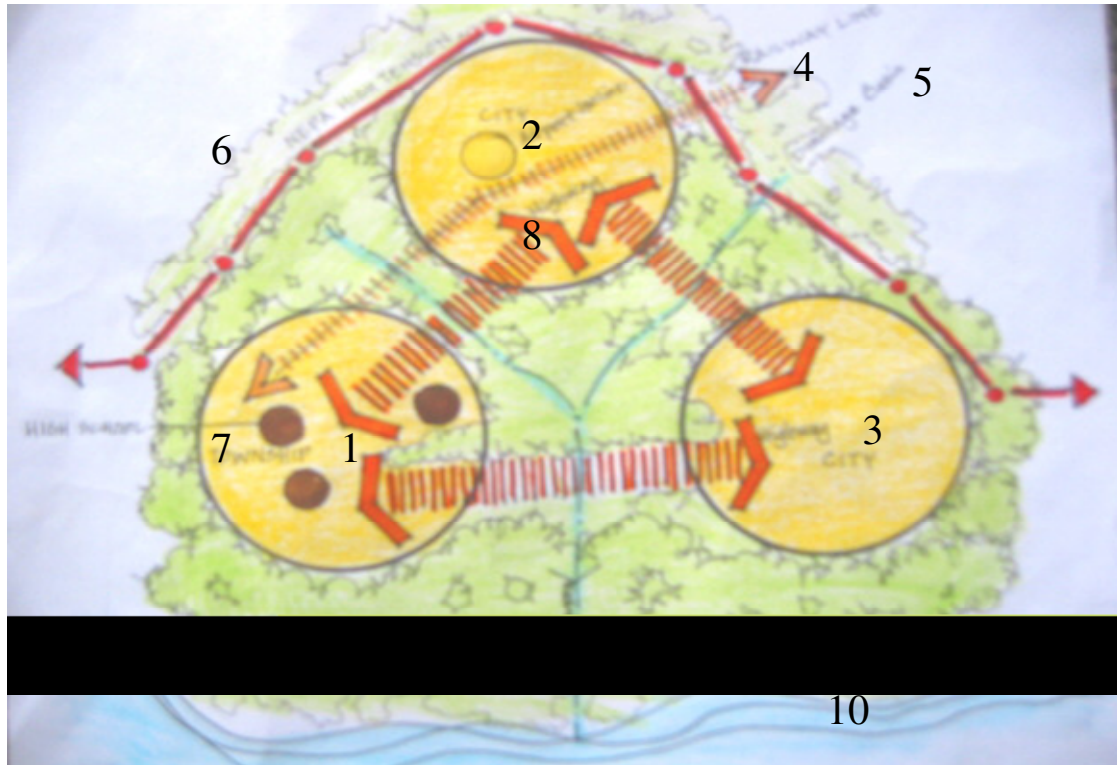


Figure 1. Map of Nigeria highlighting the metropolitan area within Lagos State.

the Greenwich Meridian and latitudes 6° 22' N and 6° 42' N of the equator. The metropolitan area comprises of seventeen out of the twenty Local Government Councils which make up the State. These include: Lagos Island, Eti-Osa, Lagos Mainland, Surulere, Ikeja, Ajeromi-Ifelodun, Amuwo-Odofin, Alimosho, Apapa, Ojo, Somolu, Kosofe, Mushin, Oshodi-Isolo, Kosofe, Agege and

Ikorodu (Figure 1). Littoral climatic variables prevail throughout the year with average daily maximum temperature of about 30°C and 29 mill bars of vapor pressure in the air at critical sunny dry season days.

Metropolitan Lagos is within the Sandy Barrier –Lagoon Complex of Western Nigeria coastline. Morphologically, this bioregion is framed by interconnecting creeks and



**1. Southern Metropolitan Townships**  
**2. Northern Metropolitan Townships**  
**3. Sub Urban Townships**  
**4. Rail Way Line**  
**5. Natural Drainage Systems**

**6. Secondary Lowland Rain Forest**  
**7. Tertiary Institution**  
**8. Highways**  
**9. Patches**  
**10. Lagoon and Creeks Setback**

**Figure 2.** Geographic concept of metropolitan Lagos.

lagoon that run parallel to the Atlantic shoreline. Surface water resources of the metropolis are therefore in four levels. At the south is the 30 km. Atlantic shoreline bounded to the north by a strip of sandy coastal wetland. Lagos lagoon received the waters of Port Novo and Badagry creeks to the west. This lagoon and creeks are fed by the rivers, wetlands and drainage canals especially Ogun River.

## METHODOLOGY

Harris et al. (1996) identified a number of issues that must be taken into consideration when assessing potential uses of land and water resources. Principal consideration includes economic returns, social pressures, cultural attachment and maximization of agricultural productivity. The later is particularly important for this study. The underpinning land assessment principle for this study is a slight modification of Harris et al. (1996) four step site investigation concept including a walkover survey; a desk study with preliminary investigation; detail investigation; and data analysis. Secondary geographic information obtained from relevant government

agencies were updated through personal observation. These include Federal Government establishments such as Military and Police barracks, Nigeria Ports Authority (NPA), Nigeria Civil Aviation and Authority (NCAA), Power Holdings Company of Nigeria (PHCN), Lagos State Ministry of Environment (Drainage department) Nigeria Railway Corporation (NRC) and Federal Ministry of Works,

The analytical study of year 2006 satellite images, 1988 topographical and hydrological maps of the metropolis enhanced the identification of prospective sites for urban agriculture.

One of the limitations of the study is the uncooperative and unwillingness of some of the agencies to release actual figures on sizes of vacant/unused plots of land within their establishments.

## RESULT

The city's planning concept presents a metropolis that is made up of many townships shaped by natural drainage ways and wet lands. The various townships are linked by highway systems while Nigerian Railway Corporation (NRC) line runs on North to South axis (Figure 2). Power Holding Company of Nigeria Plc's high-tension cables



**Plate 1.** System one- potential urban farming sites in Lagos.



**Plate 2.** Typical creek and lagoon - potential for aquaculture.

(132 and 330 KVA) and other utility lines with broad right of ways crisscrossing the metropolitan landscape. The lagoons and creeks are fed by the rivers, wetlands and drainage canals (Plates 1 and 2). These water and land resources constitute the potential sites for sustainable urban agriculture.

The ownership structure of prospective land and water resources are in four strata, namely: Federal, State, Local and Private Individuals. Lagos being the immediate past

capital of Nigeria has visible Federal landed properties that can support urban farming. Nigerian Railway Corporation(NRC), Nigerian Ports Authority(NPA), Federal Highway—managed by Federal Ministry of Works, Military Establishments (Barracks and formations), Nigeria Civil Aviation and Airport Authority(NCAA) and Power Holding Company of Nigeria (PHCN) This is in addition to the 30 km. Atlantic shore line jointly managed by the Federal and State



**Table 1.** Estimated Federal land resources in metropolitan Lagos.

S/N	Federal agency	Land resources (Ha)	Percentage (%)	Current/and potential activities/uses
1	Nigeria Railway Corporation (NRC)	526	12.25	Illegal Trading at terminals and squatters' temporary sheds along the rail line
2	Nigeria Ports Authority (NPA)	350	8.15	Aquaculture potential
3	Nigeria Civil Aviation and Airport Authority (NCAA)	225	5.24	Illegal Encroachment- illegal houses due to urban expansion pressure
4	Power Holding Authority (ROW)	1,917	44.65	Illegal encroachment by illegal structures- houses, motor parks, markets, mechanic workshops etc
5	Federal highway (ROW)	900	20.96	Waste dump (Refuse, abandoned vehicles, containers, auto mart etc.)
6	Military establishments	250	5.82	Limited access to the populace
7	Tertiary institutions	125	2.91	Some farming activities, but largely undeveloped
	Total	4,293	100.00	

Source: Field Survey, 2005.

Governments. Estimated total potential federal land area available for urban farming is shown as Table 1.

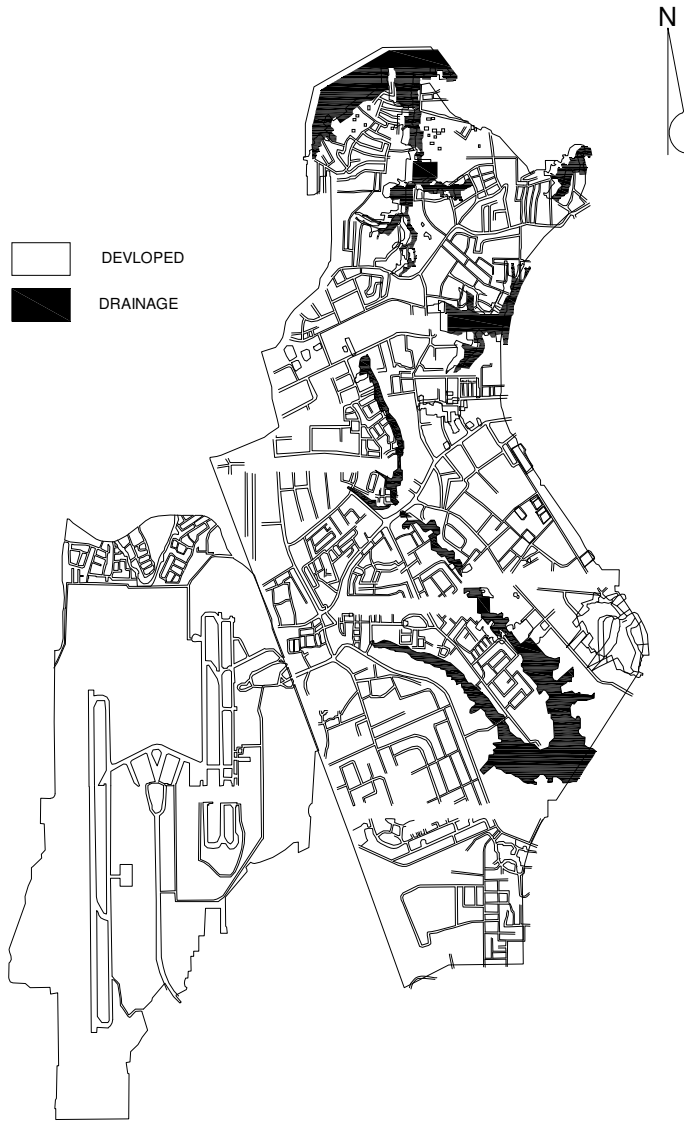
## DISCUSSION

The final outlook of a city's landscape depends on laid down sustainable environmental objectives. Where emphasis is on absolute aesthetics, floricultural aspects of urban farming prevail. On the other hand, if the goal is on meeting the nutritional requirements of city people, then oleiculture and other arms of agricultural practice will have to be visited.

The 30 km Nigeria Railway Corporation's dual carriage rail line stretches from Iddo terminus in the south to Agege in the north. The minimum set back allowed between a buildings and a railway line is 21 m (Lagos State Government, 1986, 2005). The set back on both sides of the rail line will provide 126 ha potential vegetable gardening land. This is in addition to the over 400 ha open space and buffer area at its Ebute-Metta in Lagos Mainland Local Government council area. The total land area available under Nigerian Railway Corporation is 526 ha. Nigerian Ports Authority (NPA) does not only administer Apapa and Tin Can ports but also cooperates with Lagos State Waterfront and Tourism Corporation to manage lagoons, the marinas, creeks and wetlands that constitute 22% of Lagos State surface area. The legal set back from water bodies in the city include 150 m from the ocean, 75 m from lagoon shoreline, 60 m from rivers and 15 m from canals (Lagos State Government, 1986, 2005). These water bodies and their adjoining setbacks estimated as 35 ha are potential sites for small-scale aquaculture, commercial horticulture, nurseries and dry season vegetable gardens. A typical creek and natural drainage areas within the metropolis is

shown as Figure 3.

Urban agriculture is currently thriving within the isograms of Ikeja and Muritala Mohammed International airports under the management of NCAA. Urban farming is a more compatible and safer land use than the current illegal conversion of the 225 ha buffer area to residential development. Through appropriate and efficient development control mechanisms, such lands may be repossessed and leased for agricultural purposes especially vegetable gardening. In Indonesia, highway managers lease the rights-of- way to farmers (UNDP, 1996). There are over 100 km of federal dual carriage roads in Lagos State managed by Federal Ministry of Works. Considering the statutory 90 m setback from both sides of the road (Lagos State: 1986, 2005). The total area of this highway right of way ideal for farming activities is estimated as 900 ha. Major environmental problems within the right of ways are illegal conversion to unauthorized refuse dumps; garage for disused vehicles and location of unapproved market stalls and use as makeshift motor parks and mechanic workshops. Currently, most collector streets, arterial road right of ways support peasant landscape nurserymen in the city. Street trees program is the hub of natural environmental aesthetics in cities. Properly parceled roads rights of way will accommodate thousands of peasant vegetable and commercial landscape nurserymen in the city. There are 423 and 108 km of 132 and 330 kv Power Holding of Nigeria transmission lines in the metropolis. At a setback of 30 m for 132 kv and 60 m for 330 kv according to Lagos State (1986), the estimated available land area is 1,269 and 648 ha, respectively. Proper use of the space will contribute to the city's food security. There are five military establishments in the metropolis. Ojo cantonment at the western edge of the metropolis currently accommodates the highest population of urban farmers in



**Figure 3.** Map of Lagos metropolis showing natural drainage area (Potential zone for urban agriculture).

Lagos. Other military estates in Lagos with large unutilized hectares of land are: Air force base Ikeja, Navy town Ojo, An Barracks, Yaba and Ikeja Cantonment. The approximately 250 ha of unplanned open spaces and buffer zones in these military settlements are ideal sites for military personnel household farming. Federal tertiary institutions in Lagos revolve around Yaba academic core. This area is made up of University of Lagos, Yaba College of Technology and Federal Technical School. Currently, there are some traces of urban agricultural practice at the University of Lagos with emphasis on vegetable production. Our survey estimated 125 ha potential urban farming area within this core. This is in addition to the lagoon and wetlands that can accommodate aquaculture.

Similar agencies and institutions at the State level are

in a better position to accommodate urban farming. This is due to the fact that the Lagos state government directly manages the metropolis. A synopsis of potential sites under the direct control of Lagos State Government is addressed as Table 2

Over ninety percent of potential wetlands suitable for urban farming are controlled by the state government as setbacks for the natural drainage networks within the metropolis. Wetlands (drainage basins and flood plains) separate the various townships and cities that make up metropolitan Lagos. This is shown as Table 3 and Figure 1. Lagos State Ministry of Environment (Drainage department) controls these natural basins and forested wetland in the city. The most ideal area for both aquaculture and vegetable production are the flood plains of the major rivers, wetlands and natural drainage basin that frame the various local government councils and townships. There are six major natural drainage basins, (referred to as systems by the Drainage Department, Lagos State Ministry of Environment) which have a total length of 112.26 km (Table 3). Lagos State (1986) requires setbacks or right of way of 30 m from each side of a drainage channel. If this law is religiously enforced and complied with; systems 1, 2,3, 4, 5 and 6 will provide 113.49, 41.97, 28.18, 42.5, 126.14, and 320.73 ha of arable land for urban agriculture, respectively. Collectively, the six drainage channels (systems 1 to 6) will provide an estimated area of  $(112.22 \times 1,000 \times 60)/10,000 = 673.01$  ha. Currently, encroachment by illegal land speculators, squatters and their current unhygienic use as refuse dump sites are challenges to be tackled by the state government through the enforcement of the Lagos State Town and Country Planning (Building Regulations) law of 1986, the Lagos State Urban and Regional Planning Edict No 2 of 19997, the Lagos State Environmental Sanitation law No 1 of 2000 and the Lagos State Physical Planning and Development Authority law of 2005).

Lagos lagoon, Port Novo and Five Cowry creeks are the major waterways in the metropolis under the management of Lagos Tourism and Waterfront Development Board. Pen and cage fish farming at selected points along the over 120 km waterways will increase local supply of seafood in the State. This is in addition to the 35 ha set back ideal for dry season vegetable production.

Lagos State Development and Property Corporation, (LSDPC), New Town Development Authority and (NTDA), Lagos State Ministry of Housing are the three agencies saddled with housing provision in the state .All these agencies have disused plots, unplanned open spaces and buffer land that can be put to productive urban agriculture use. Land resources from this sector are estimated at 105 ha. During the course of our data collection, we observed that some private schools especially primary and secondary schools on the fringes of the metropolis manage successful school gardens with profitable poultry, vegetable plots and fishponds. With the recent return of many of the missionary schools to their



**Table 2.** Estimated state land resources in Lagos metropolis.

S/N	State agency	Land resources (Ha)	Percentage (%)	Current/potential uses/activities
1	Drainage Channels (Systems 1 to 6)	28,405	98.3	Illegal encroachment/ refuse dump
3	State Arterial (ROW)	125	0.43	Refuse dump prominent
4	Housing estate (Buffer)	105	0.36	Illegal conversion to corner and artisan shops
5	Tertiary Institutions (Unused Land area)	85	0.29	Limited farming activities
6	Private Institutions	95	0.32	Mostly unutilized
7	Vacant city plots	75	0.26	Private ownership-generally inaccessible to the populace
	Total	28,890	100.00	

Source: Field Survey, 2005.

**Table 3.** Major drainage channels in Lagos metropolis, their length and useable setback area for urban agriculture.

Systems	Length* (km)	Setback area suitable for urban agriculture (Ha)	percentage of setback area suitable for urban agriculture (%)	Remarks on current activities /use
System 1- Odo Iya Alaro channel From behind Cadbury-Awolowo Way- Oregon link bridge-Odo Iya Alaro bridge-3 <sup>rd</sup> Mainland bridge-Agboyi Creek by Ogudu Foreshore	18.93	113.49	16.86	Occupation by squatters construction of makeshift structures (houses, churches) Use as refuse dump, and mechanic workshop
system 2- Shomolu channel, From Apata street - Anifowoshe street - Abiodun street - Bajulaiye road - Adetayo Osho street - Unilag road - Lagoon.	7.0	41.97	6.24	Occupation by squatters construction of makeshift structures (houses, churches) Use as refuse dump, and mechanic workshop
System 3- Oyadiran/Iwaya/Makoko channel Sabo-Oyadiran Estate-Makoko-Lagoon and Iwaya-Dacosta-Makoko Canal-lagoon	4.7	28.18	4.19	Occupation by squatters construction of makeshift structures (houses, churches) Use as refuse dump, and mechanic workshop
System 4- Drainage channel NTA 7 – Stadium-Western Avenue – Bode Thomas- Breweries-National Theatre-Otto Creek	7.09	42.5	6.31	Occupation by squatters construction of makeshift structures (houses, churches) Use as refuse dump, and mechanic workshop
System 5. Drainage channel City way-Nathan/Olufemi street-Tejuosho Road-Barracks - Allen/Gbaja-Akerele Street-Alhaji Masha-Babs Anumashaun - Coker Village-Lagos/Badagry	21.04	126.14	18.74	Occupation by squatters construction of makeshift structures (houses, churches) Use as refuse dump, and mechanic workshop
System 6- Comprises of 5 Sub channels which are: system 6A: Oshodi/Shogunle channel; system 6B: Oshodi/Osolo channel; system 6C: Odo-Ashimowe channel; System 6D: Airport channel; system 6E: Oke Afa channel.	53.5	320.73	47.66	Occupation by squatters construction of makeshift structures (houses, churches) Use as refuse dump, and mechanic workshop
Total	112.26	673.01	100.00	

\*Source: World Bank Assisted Lagos Drainage and Sanitation Project, 1998.

original owners by the Lagos State government, some of the degraded school landscape can be remediated to support urban farming. Our inventory estimated 95 ha of such landscapes in the city. The use of rear and sideyards of urban residential plots for home gardening, poultry and free range livestock is a well known fact. In the metropolis, vacant private plots will satisfy this practice. Private arrangements under the supervision of Local Government officials will increase the potential farming areas in the city. 75 ha of such plots are estimated in the metropolis.

These Federal and State land and water resources can be effectively utilized through a four-stage program of detailed inventory on local scale, proper documentation, subdivision into manageable plots and formulation of appropriate development control mechanism that will not hinder the primary goal for which they were originally established. Detail inventory in the form of cadastral register with appropriate ownership classification is particularly necessary for privately owned plots. Inventories involve a physical determination of actual land resources available and the original land use zoning for such land. Accurate information on the total hectares will help in the determination of the population of desired farmers, detail agricultural potential of the soil resources and their carrying capacity.

## Conclusion

There is a need for a conscious holistic planning for the sum total image of the city. The intervention and synergy of governments at federal, state and local levels is necessary to properly accommodate farming policies within the metropolitan landscape. The use of government land areas requires a detail understanding of the long-term goals and objectives of the primary land use. Entrenchment of urban agriculture in the food security and environmental aesthetic scheme of the metropolis may take into consideration the following recommendations:

1. Development of conceptual frame work of research and extension network for urban agriculture. This is aimed at influencing the choice and productivity of crops as well as the population of farmers.
2. Vulnerability and suitability studies to identify appropriate food crops.
3. Determination of productive and profitable plot size for each farmer. Subdivision is often a reflection of suggested crop and land use intensity.
4. Urban agricultural land platting must be accompanied by simple ordinance to avoid clash between the interest of farmers and long term government land use goal. Such ordinance needs to bear in mind the environmental impact of urban farming. At the national level, there is need to facilitate access to public lands and waterways. State government's involvement is necessary since the

nation's constitution did not accommodate city government.

5. Preparation of urban land use plan such as the Ikoyi-Victoria Island model city plan and creation of regulatory mechanisms friendly to edible landscape.
6. Comprehensive demand and supply analysis of favored sea food that can be raised by small scale fish, shrimp and prawn farmers.
7. Discouragement of discharge of raw sewage into the lagoons and creeks to checkmate the prevailing water pollution.
8. Consideration for agro based microfinance for small scale urban farmers.
9. Coordinated and effective marketing scheme that will enhance daily sale of harvested crops.

Metropolitan Lagos is in dire need of productive agricultural landscape to sustain the growing population. Since buildable and marginal land areas in the state are very cumbersome to acquire, an interest in urban agriculture must look in the direction of already acquired federal, state and local government land resources. Above all, Lagos State Ministry of Justice, Lagos State Ministry of Agriculture and Rural Development, Lagos State Ministry of Environment and Lagos State Ministry of Physical Planning and Urban Development must cooperate and collaborate to draw up guidelines and legislations that will enhance the formulation of effective urban agriculture policy in the state in general and the metropolis in particular.

## REFERENCES

- Acquay HK (2000). Poverty and Environment in Sub-Saharan Africa. Paper Presented at Global South Perspective Conference. Global Environment Facility. Washington D.C.
- Ashiyambi J (2005). Review of the Lagos State Regional Master Plan (1980-2000). Lagos State Ministry of Physical Planning. Alausa, Ikeja.
- Berg P (1998). The Post Environmental directions of Bioregionalism. Being a lecture delivered at the University of Montana, Missoula Planet Drum foundation. P.O.Box 31251, San Francisco, CA 94131, USA.
- Downton PF (2003). The Ecopolis Development Principles. *The Urban Ecology*, Australia Newsletter No 43, Adelaide, Australia.
- Drescher AN (1996). Management Strategies in Africa Home Gardens and the Need for New Extension Approach. Paper Presented at the International Symposium on Food Security and Innovation- Success and Lesson Learned. Stuttgart, Germany.
- Freeman D (1996). A City of Farmers; Informal Urban Agriculture in the Open Spaces of Nairobi, Kenya. McGill Queen's University Press, Canada.
- FAO (1996). Food Supply and Crop Prospects in Sub Saharan Africa. In Food and Agriculture Organization of United Nations E.S.C.G., F.A.O., Rome. Italy.
- Hardy J, Diana M, Scallerthwaite D (1996). Environmental Problems in Third World Cities. Earthscan. London.
- Harris J, Birch P, Palmer J (1996). Land Restoration and Reclamation: Principles and Practice. Addison Wesley Longman Limited. Essex CM20 2JE, England.
- Kunze D (1998). Closing the Nutrients Cycle for Urban Food Security and Environmental Protection. International Workshop on Urban and Peri Urban Agriculture. IBSRAM and FAO. Accra. Ghana.

- Lagos State Government (1992). Lagos State Government Diary. Lagos State Government Press, the Secretariat, Alausa, Ikeja, Lagos.
- Lagos State Government (1997). Lagos State Urban and Regional Planning Board Edict. Lagos State official Gazette, 5(31): 1998.
- Lagos State Government (2005). Lagos State Physical Planning and Development Authority Regulations. Lagos State official Gazette No 6(40) of 2007.
- Lagos State Government (1986). Lagos State Town and Country Planning (Building Regulations) Authority Edict. Lagos State official Gazette No 38 ISSN 0189-0174, Ikeja, Lagos.
- Obasanjo O (2002). Being President of Federal Republic of Nigeria's Speech at the Plenary High Segment. World Summit on Sustainable Development (WSSD). Johannesburg.
- Osagie C (2002). Food Report in Africa. This Day Daily Newspaper, Vol. 8 p. 27, #7704.
- People and Planet (2005). People, food and agriculture, Peopleandplanet.net,© people and the planet pp. 2000-2009.
- Population Reports (1997). Population Information Program, Center for Communication Program. The Johns Hopkins School of Public Health, 111 Market Place, Suite 3-10, Baltimore Maryland, pp. 21202-4012.
- Rees C, Wackernager M (1991). Our Ecological Footprint: Reducing Human Impact on the Earth. New Society Publishers. Gabriella Island, BC.
- Ryn S, Cowan S (1999). Ecological Design. McGraw-Hill Publication Company Limited, New York.
- Tansa Musa (1996). Yaunde, Cameroon becomes Garden City. City Farmer. Canadian International Development Research Center. Ottawa, Canada.
- UN (1992). Sustainable Development - Agenda 21. Proceeding of United Nations Conference on Environment and Development. (Earth Summit 1). Rio de Janeiro. Brazil.
- UNDP (1996a). Urban Agriculture; Food, Jobs and Sustainable Cities. UNDP. New York.
- UNDP(1996b). Sustainable Human Settlement. Report of The United Nations Conference on Human Settlements (Habitat II). Istanbul, Turkey.
- World Bank (2000). World Development Report 2000/2001: Attacking Poverty. Oxford Press, New York.
- WCED (1987). Our Common Future. World Commission on Environment and Development. Oxford University Press. Oxford, London.