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Urban Landscape Planning and Soil Variation in Nigeria: Lokoja as a Case Study

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Abstract

The legacies of the colonial masters of a well landscaped environment have been left to rot due to negligence and increase need for urban land for anthropogenic activities. This had led to recent attempts of revival by the government through tree planting campaigns, which have not yielded desired result. Soil factor have been found to be neglected in landscaping the urban environment, this have been attributed to failure of landscaping attempts in the study area. This research attempted to find the relationship between the vegetation species distribution and soil physical properties with use of spearman's correlation coefficient. The findings show that relationship between vegetation species distribution and soil physical properties are not significant, this may mean that there are other factors that must be considered in determining why certain species of plant thrive in certain areas than the other.

Key words: Soil degradation; Colonial legacies; Landscaping; Vegetation species

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INTRODUCTION

Landscaping otherwise described as landscape planning has been described as a process concerned with activities geared towards the articulation of existing open spaces for the purpose of enhancing the quality of the environment (Essaghah, 1997). This includes the process of rehabilitation of open spaces as well as the coordination of the existing relationship between them. This is usually carried out in the cities with the main aim of protecting property values to revive civic pride, promote circulation and increase environmental well being, in some cases to create leisure areas.

The idea of landscaping in Nigerian cities can be traced to early period of colonization by the British, this predates the period of independence. This idea came basically from the British colonial masters, who brought with them a new socio-political and economic structure. Oduaye (1998) describes the areas occupied by the colonialists and their work places as areas bedecked with ornamental plants, flowers arranged in a functional, formal manner. This trend remained so until after independence, but as time went on, the phenomena of rapid urbanization led to gradual depletion and destruction of the scenic legacies left by the Europeans and the culture of tree planting and landscaping gradually disappeared, this gave way to built up environment where houses are now fenced with very thick and high brick and concrerete walls in the stead of flowers and plants or hedges.

Several attempts by the recent government to revive this landscaping culture have failed because emphasis have been laid mostly on just the planting factors in solving the problem without much concern on the physical condition of the areas in term of soil condition or plant species. It is therefore hypothesized that there is a significant relationship between soil properties and vegetation species distribution.

This paper appraises the state of urban landscaping in Nigeria generally and Lokoja town in particular. This will be carried out through the classification of periods of development from pre-independence to the post independence period.

Pre-Independence Period

This period coincided with the colonial period, when there were no deliberate attempts to landscape the city's environment, until 1863, in Lagos when the town

improvement ordinance was promulgated to control development and to improve sanitation. This brought about the segregation of the European abode from that of the natives, it was then described as the Government Reserved Area (GRA). Standard of landuse were given and then implemented, where hedges in form of plants were used to demarcate land boundaries, as fences, residential houses were surrounded by vast expanse of land or open spaces, which relatively were made functional by planting of ornamental plants and flowers. The concept of GRA then spread to other major cities in the country, including cities like, Kaduna, Enugu, port-Harcourt, Lokoja. At this period the supervision of landscape planning and urban development was carried out by officials of the health management board.

By 1946 the Nigerian town and country planning law, was promulgated after the British town planning law of 1932, with chapter 123 for western region, chapter 130 for the northern region and chapter 155 for the Eastern region. It was to be concerned with the improvement and development of landuse in the major cities of Nigeria, this was valid up to independence in 1960.

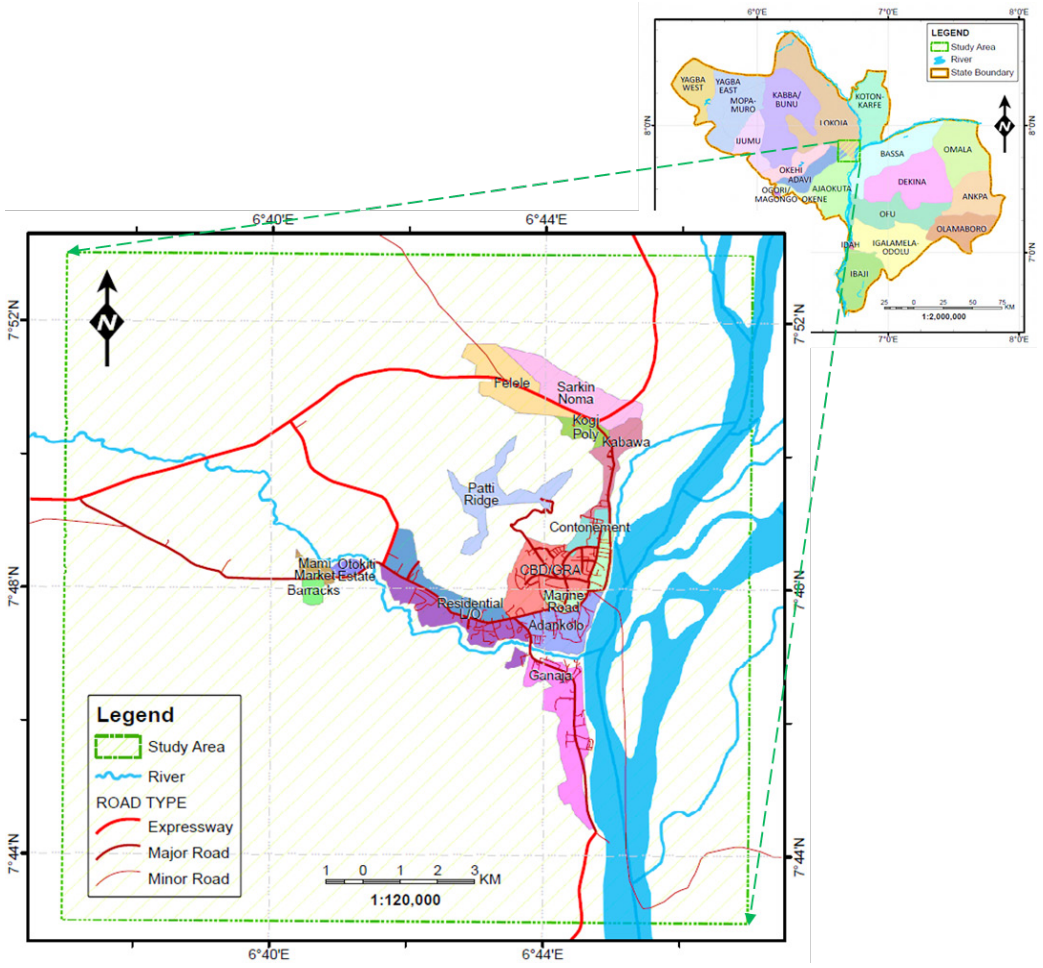
Post Independence

After the Nigeria independence in 1960 the foot print of landscape left by the colonial masters was still vividly visible in all establishments they left behind and the area of the former residences, also represented in parks, playgrounds. Like in every city they left squares and race courses, which were used for horse racing and other sporting activities, even though some now have their names changed to indigenous names, like the race course in Lagos have its name changed to Tinubu square, that of Kaduna now bear the name Murtala Mohammed square. Even areas for leisure like the government garden in Kaduna created during the reign of lard Lugard, is now called Gamji. Not to mention street names that were once boulevards with colonial names now bear indigenous Nigerian names. Never the less the relics of the colonial inprint still persist to this day in these cities.

1. THE STUDY AREA

1.1 Location

Lokoja is located between latitude 7° 45' N, 7° 51'N of the equator and longitude 6o 41' E 6o 45'E of the Greenwich Meridian. It is bounded in the west by the River Niger at an altitude of 45-125mtre above sea level. It is also surrounded by pockets of hills of which the highest in the Patti ridge.



1.1.1 Vegetation and Rainfall

The area is categorized to be within the guinea savannah belt, even though what we really have now is the derived savannah, only resistant vegetation still remains dominant due to anthropogenic activities of bush clearing and burning, lumbering, most of area consists of secondary regrowth. Short grasses like Andropogon tectorum, Bambusa vulgarise, Panicum laxum, Cynodon dactylon. The tall trees found in the area include, Carapa procera, Elaeis guineensis, Enanma chloranta, while the shrub species are the Sida acuta, Chromolaena odorantum, Mimosa pudica, Cassi tora.

The climate described as the tropical wet and dry climate of the Koppen's classification. It is characterized by wet and dry season, the rain begins in May and ends in October. With a maximum temperature of 37.9 ^{0}C, maximum temperature between December to April, average annual rainfall of about 1000mm and a relative humidity at 60%.

1.1.2 Trend in Landscape

The study area has not been an exception to all aforementioned trends of loss of aesthetics. The area become a British settlement under the leadership of William Baikie in 1860 and continued to be so until independence in 1960. The declaration of the protectorate of Northern Nigeria, in 1900 with the lowering of the flag of royal Niger company (RNC) and the rising of the British union jack (UJ) in its stead in January -1, 1900 took place here, thus Lokoja was seen then as the capital of the British protectorate in the Niger area(which eventually became Nigeria). This enhanced the status of the town as a British settlement. At this period the Europeans form the bulk of the population of the town, hence the town was then referred to as "Garin Bature", which is translated in Hausa to mean the city of Europeans. The natives mostly lived on the surrounding hills for fear of being capture by slave raiders. Historical account gave a census record carried out in 1870 as of population of 500 inhabitants, with 40 Christians and 460 Muslims, mainly of Hausa and Nupe descents.

By the 1900 the population of Lokoja had increased to 12 thousand, with 50% being Hausas. The Hausa dominance began to wane by 1960 when other smaller ethnic groups from other parts of the country started migrating into the town mainly to replace the Europeans that had to leave after independence. This was so because most of them had acquired the western education. Notably among the Europeans that had ruled in Lokoja is Dr William Baikie, Sir George Goldie, Lard Lugard (Ocheja, 2005)

The foregoing have shown indeed that Lokoja was indeed a "Garin Bature", with imprints of the Europeans still visible, until recently where most of these legacy have been abandoned, destroyed to give way to anthropogenic activities.

To this day the area has now become a cosmolitan town far from the model farm town started by Dr Biekie. It attained the status of a state capital in 1991, with a population of 77,516 and a density of 7 persons per hectares, this population has there after increased to 195,261 as at 2006(National population commission 2006). This had brought an increase quest for land for urban development and consequently clearing of land for housing and road construction. Which consequently led to clearance of the natural landscape, the destruction of the legacy of ornamental plants and trees, which were left to rot due to negligence and lack of maintenance and a resultant increase in bare surfaces, as a consequence areas that were once parks or even cemeteries have been taken over by buildings, which had been attributed to increase erosion and flooding and the development of urban heat island (Alabi & Ufuah, 2007), (Scalenghe & Marsan, 2009).

This trend can be likened to the general phenomena of landscape development which does not appear in any society until a period of stable peace, prosperity, wealth and influence have been established (Tandy, 1978) .

Several attempts by the recent governments to embark on prompt response to floods, erosion and deforestation by promoting tree planting at the states and local level, mobilization of cooperate bodies to plant trees and flowers is well documented in literature, this attempts have however failed to achieve the desired result, which have been attributed to low income, illiteracy, myths and superstition, lack of physical planning process, legal and administrative requirement on landscaping (Alabi & Ufuah, 2007). One of the factors mostly neglected during landscaping implementation is lack of consideration of soil as factor determining the types of plant that will grow in certain area. In most cases plants foreign to the area is brought to grow without due consideration to soil type.

1.2 Methodology

A geometric centre of each grid on selected quadrant of 25m sq will be measured at selected points in 10 selected neighborhoods, points will be randomly selected, the soil properties of each point will be analyzed; the vegetation species will be noted. The data collected will analyzed by using spearman's correlation coefficient, using SPSS statistics soft ware, where vegetation species population will be regressed against the soil properties of the selected area to find out if there is a significant relationship between the vegetation and soil properties of the area.

1.2.1 Conceptual Framework

Oduaye (1997) suggested that various methods can be adopted to examine landscape; Weedle (1979) also suggested two approaches such as territorial approach and the problem solving approach. The territorial approach is applied when planning for a small area, while the problem approach is applied when planning for a large expanse of land. Another method identified is the market research techniques, in which individuals are requested to identify and rank photographs or slides of the landscape referring to specific area of study. However aside from the different

methods that can be applied to landscaping, the definitions of urban landscaping means different things to different people, Benedict and Mc Mahan (2003) defines it as natural features in urban areas including trees, wetlands, streams, and green open spaces. Beatly (2000) and Weber, Slone, Wolve (2006) think of urban landscape in terms of planning practices and policies. They emphases the conservation of natural resources combined with the re-engineering of the urban environment to promote natural hydrological cycles.

Many researchers believe that there is a correlation between soil and vegetation found in a landscape. Bowman (2000) carried out a research in northern Nigeria, where he observed that soil moisture retains adequate moisture, plants grow well and where there is little moisture certain plants don't survive. Phil-eze (1995) also studied the response of vegetation on site factors on the Nsukka plateau and reported the response of plant species to topography of the Nsukka plateau. Also Ramsy and Leeuw (1965) in their analysis of savannah vegetation noted a close relationship between soil and vegetation development on the middle of Angola region by soil parent material. Areola (1983) also agrees that soil and vegetation are closely related and associated with one another. Isah and Shinka (2000) carried out a vegetation soil study in Sokoto state Nigeria and they concluded that change in vegetation is due to variation in the soil composition. In conclusion Ukpong (2000) examined the vegetation structure and environmental determinant in the creek town of Calabar area river swamp, he observed that the environmental variables have strongest relationship with vegetation structure of the area.

2. ANALYSIS OF DATA

* Table 1 Plant Form Distribution in Selected Locations

Table 1
Plant form Distribution in Selected Locations

Point station	Location	Shrubs	Grasses	Herbs	Climbers	Creep-ers	Trees
1	Sarkin noma	8	7	8	3	0	13
2	Felele	16	7	8	3	0	32
3	Ganaja	4	5	5	1	1	7
4	Otokiti	8	6	8	2	0	16
5	Kabba road	9	7	12	3	1	19
6	lokogoma	12	5	7	1	0	13
7	Patti ridge	7	3	7	1	0	7
8	Lokoja central	6	5	6	1	0	14
9	Barrack area	8	4	8	2	0	14
10	Kogi poly	12	6	10	3	1	27

The Table 1 above shows that the study area is dominated by trees, especially around the Felele, kabba road, kogi poly areas, this could be explained as so because part of these areas are still reserved as farmlands, the kogi poly still retains most of its trees since it is a site for an educational institution, it could also be notice to have a high population of different species of shrubs and herbs which might have been deliberately preserved.

*Table 2 Vegetation Species Type Distribution in Selected Locations

The Table 2 shows vegetation species found in the study area , which is a direct attribute of soil type. Point-2 in the Felele area shows the highest number of plant species with 11, while lowest can be found around point-9 around the barrack area with 3 types of species.

*Table 3.0 Soil physical properties in selected locations

Table 2
Vegetation Species Type Distribution in Selected Locations

Point station	Location	DE	EG	KA	CP	GK	MI	PG	ME	SG	IG	TA	PM	GA	TOTAL
1	Sarkin noma	-	3	1	-	1	2	1	-	1	-	-	-	-	9
2	Felele	2	2	-	1	2	1	-	1	-	2	-	1	-	12
3	Ganaja	-	-	-	1	1	2	-	-	-	-	1	1	-	6
4	Otokiti						1			1		1	1		5
5	Kabba road	1	-	-	-	-	1	1	1	-	2	-		-	6
6	lokongoma	-	1	-	-	1	1	-	1		1		-	-	5
7	Patti ridge	-	-	-	1	-	-	1	-	1	1	-	1	-	5
8	Lokoja central	1	1	1	-	-	1	-	1	1		-	1	-	8
9	Barrack area	-	-	1	-	-	-	1	-	-		-	-	1	3
10	Kogi poly	1	1	-	-	-	1	-	1	-	-	1	1	-	6
Total															65

Notes: DE - dacryodes edulis, EG - eaeis genesis, CP - ceibi pedantra, GK - garcinia chloranta, MI - magnifera indicia, PG - psidium guajava, ME - milicia excelsa, SG - citrus sinensis, IG - irvingi gabonensis, TA - treculia Africa, PM - pentaelethra macrophylla, GA - gambeya albidium.

Table 3
Soil Physical Properties in Selected Locations

Point station	location	PH	C %	OM %	N %	K	NA %	C %	MG %	CEC %	CLAY %	SILT %	FINE %	COARSE %	T %	TOTAL
1	Sarkin noma	4.60	0.57	0.98	0.04	1.74	0.02	0.20	0.80	5.96	7.00	6.99	25.0	63.0	LS	116.90
2	Felele	4.80	0.47	0.89	0.04	0.04	6.14	1.74	0.01	6.14	7.00	6.00	14.00	73.00	SL	106.27
3	Ganaja	5.60	1.44	0.75	0.04	1.64	0.40		0.20	5.85	9. 00	8.00	24.00	59.00	LS	115.92
4	Otokiti	4.80	0.56	0.65	0.56	1.63	0.02	0.10	1.00	11.25	7.00	6.00	39.00	48.00	LS	120.37
5	Kabba road	5.7	0.44	0.75	0.06	1.34	0.02	0.20	0.40	6.26	12.00	16.00	26.00	47.00	SL	167.47
6	lokongoma	4.7	1.14	0.65	0.05	1.38	0.01	0.36	0.40	5.95	7.00	6.00	29.00	58.00	LS	108.64
7	Patti ridge	5.7	0.45	0.64	0.63	1.63	0.01	0.60	0.8	5.43	9.00	8.00	16.00	37.00	LS	77.89
8	Lokoja central	4.7	1.07	1.85	0.68	1.76	0.02	0.40	0.40	6.98	17.00	10.00	40.0	33.0	SL	117.86
9	Barrack area	5.60	0.37	1.96	0.03	1.48	0.02	0.40	0.80	4.76	7.00	6.00	26.00	61.00	LS	165.42
10	Kogi poly	4.00	0.44	0.81	0.03	1.63	0.01	0.20	0.60	6.40	7.00	4.00	30.00	59.00	S	114.12
Total																8921.97

Notes: LS - loamy sand, SL - sandy loam, Na - sodium, S - sand, Ca - calcium, C - carbon, OM - organic matter, N - nitrogen, K - potassium, Mg - magnesium, CEC - cation exchange capacity, T - texture.

The Table 3 shows the physical characteristics of the soil in the study area. Three main types of soil were found in the area, which are the clay, sandy and silt in varying proportion. The point, 2, 5 and 8 around the Felele, Kabba road and Lokoja central respectively were found to be area of loamy soil, this can be explained to be the result of high precipitation and high temperature which encourages rapid break down of organic elements and loam formation.

Soil in most of the areas show high rate of acidity, with a very high PH value with the point 3,6,10 having a PH value of 4.8, 4.7 and 4.00 respectively, also noticeable is the high percentage of carbon present in the soils, this can be seen in point 5 and 6 with soil with carbon content about 1.14%around the Lokongoma and the Kabba-road area respectively. The table also shows the soil texture, which is the relative size of the particles, in proportion of silt, sand and clay.

To test the hypothesis if there is a significant relationship between soil properties and vegetation species, the spearman correlation technique is used to test this relationship. Where -X value is the independent variable is the soil physical properties, and the Y is the dependent variable is the vegetation using the Table 4.0 below .

Table 4 soil physical properties and vegetation data.

Table 4
Soil Physical Properties and Vegetation Data

Point station	X	Y
1	116.90	9
2	106.27	12
3	115.92	6
4	120.37	5
5	167.47	6
6	108.64	5
7	77.89	5
8	117.86	8
9	165.42	3
10	114.12	6
Total	8921.97	65

3. RESULT AND DISCUSSION

*Table 5 Correlations.

Table 5
Correlations

	X	Y
Pearson correlation	1	0.300
Sig.(2-tailed)		0.399

The Table 5 shows the result of the spearman's correlation of vegetation species distribution and the soil physical properties. It indicates a significant value at 0.300 which is low for a significant relationship, it means there is little correlation between variation in soil physical properties and vegetation species found in the area. This is contrary to the expected, since one expects a strong correlation. This may however be attributed to changes that had occurred over the years due to anthropogenic activities on vegetation where the original vegetation had been destroyed by clearance for built-up and road construction, mainly plant that have resisted this activities or are of low economic values have remained.

CONCLUSION

In conclusion the result have shown that the relationship between vegetation species and soil physical properties are not significant in the study area, this may mean that there are other factors that must be considered in determining why certain species of plant thrive in certain areas than the other, there is therefore a need for another research that will consider factors such as the socio-cultural activities of the inhabitants or even their poverty level to be able to find clearly this relationship.

REFERENCES

Alabi, M. O., Ufuah, M. E. (2007). An Assessment of Farmland Conversion to Built Environment on the Bank of the River Niger in Lokoja. *Environmental Research Digest, Ambrose*

Ali University , Ekpoma, 2(1),11-19.

Adesina, F. A. (1989). Plant Species Characteristics and Vegetation Dynamics in the Tropics. *International Journal of Environmental Studies, 33,* 67-78.

Areola, O. (1993). Soil and Vegetal Resources of Nigeria. *In* Oguntoyinbo *et al*. Eds., *A Geography of Nigerian Development* (pp. 105-126). Nigeria: Heinemann Education Books.

Bowman, B. C. (2000). Tropical Rain Forests. *Progress in Physical Geography*, *2*, 103-109.

Beatley, T. (2000). Green Urbanism. *Learning from European Cities*. Washington, DC: Island Press.

Essaghah, A. (1997). *Urban Planning Concepts , Standards and Symbols* (pp. 59-62). Lagos, Nigeria: Amfitop Books Nig. Ltd..

Isah, A. D., Shinkan, M. A. (2000). *Soil Vegetation of Northern Nigeria* (pp. 44-46). Hybrid Publisher's Ltd.

McMahon, E. T., & Benedict, M. A. (2003). Green Infrastructure. *Smart Conservation for the 21st Century:* Sprawl Watch Clearinghouse Monograph Series. Retrieved from http://www.sprawlwatch.org/greeninfrastructure.pdf

National Population Commission. (NPC) (2006). *Kogi State Population Gazzet*.

Ocheja, D. H. (2005). *Lokoja, the Mother of Nigeria, History from 1800-2005* (pp. 13-39). Booby Press, Lokoja,Nigeria.

Oduwaye, A. O. (1998). Urban Landscape Planning Experience in Nigeria. *Journal of Landscape and Urban Planning, 43*(1-3),133-142.

Phil-eze, P. O. (1995). *Vegetation Response to Site Factors in the Savannah Region of Nsukka Plateau of Southern Nigeria* (Unpublished Phd Thesis). University of Nigeria, Nsukka.

Ramsey, D.,& Leeuw, P.N. (1965). An Analysis of Nigerian Savannah: The Vegetation of the Middle Gongola Region by Soil Parent Materials. *Journal of Ecology, 52,* 43-65.

Scalenghe, R. & Marsan, A. (2009). The Anthropogenic Sealing of Soils in Urban Areas. *Journal of Landscape and Urban Planning, 90,*1-10.

Ukpong, I. E. (2000). Environmental Determinant of Mangrove Vegetation Structure as Reviewed by Regression Analysis. *Published Journal of Ecology,* 69-78.