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Comparative Assessment of Urban Plant Life Form Abundance in the Capital Cities of the South South Region, Nigeria

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Abstract
The study examined the urban life form abundance in the capital cities of the South south region of Nigeria. The study established quadrats of 30m x 200m along road (transects) in Government Reserved Areas (GRAs) of Uyo, Yenagoa, Calabar, Asaba, Benin City and Port Harcourt and were labelled as sampled sites whereby plants were identified and enumerated. Thereafter, the plants were categorised to major life form. Descriptive statistics were used to describe the frequency and percentages of the life form while inferential statistics in form of analysis of variance was used to determine the variation in the life form among the study locations. Findings revealed that the plant species composition of 81 different species in the study area were made up of three life forms namely trees, shrubs and herbs. Of the total life forms, 56.8% were trees, 34.6% were shrubs while 8.6% were herbs. Similarly, for the individual plant life form having a total of 166, 59.6% were trees, 34.3% were shrubs and 6.1% were herbs. Findings also revealed that Port Harcourt and Uyo recorded the highest trees (22.2%) while Port Harcourt only recorded the highest shrub (31.6%) and Asaba recorded the highest herbs with 50.0%. Significant variation was found in the abundance of life form of urban plants among the study locations ($F=3.935$; $p=0.002$). The study concluded that the abundance life form of urban plants in the capital cities of the South south Region of Nigeria were varied and it is therefore recommended that tree planting and conservation should be practised especially in the areas with less urban plant life form in the South south region of Nigeria.

Keywords: Abundance; Assessment; Life form; Nigeria; South south

Introduction

Urban vegetation provides a broad variety of ecosystem services in an organised and planned area of the urban society which include environmental improvement, aesthetic enhancement, ecological enrichment; and economic and social benefits for residents (Jim, 2013; Guo, 2018). Additionally, urban vegetation contributes to human health and psychological well-being (Hanski et al., 2012). There is a growing consensus that functional diversity, or the value and range of species traits, rather than species numbers per se, strongly determines ecosystem functioning (Díaz and Cabido, 2001; Guo, 2018). The urban landscape transformation due to urbanization is a matter of concern to environmental managers in recent times because of environmental problems derived from such land use change. In this regard, the roles of urban forestry which is concerned with enhancing the vegetation within any entire urban area cannot be over emphasized (Eludoyin *et al*, 2014). It is generally understood that tropical rainforests are recognised globally for their rich biodiversity, socio-economic importance, the ecosystems services they provide, and their potential for buffering the impacts of climate change (David et al., 2016). In terms of

ameliorating the effects of climate change, tropical rainforest represent some of the most carbon-dense terrestrial ecosystems on the planet, and play a key role in global carbon cycling (Clark, 2004).

However, the alarming rate of losing plants in the highly diverse tropical rainforests has resulted into fragmentation and has posed a great threat to global biological diversity (Pimm and Raven 2000; David et al., 2016). This is a new trend in the vegetation conservation in the tropics amidst urbanization and industrialization. Laurance (2004) and David et al (2016) reported that fragmented landscapes have developed due to the increasing transformation and anthropogenic pressures on tropical forest tracts, and it becomes important to have the understanding of their effects on patterns of biological diversity with respect to life forms diversity. Laurance et al (2001) and Benitez-Malvido & Martinez-Ramos (2003) also reported that studies have shown tropical forest fragmentation to cause ecological changes to the plant community and composition by increasing large tree mortality, damage, and loss of live biomass, and reduction in understory plant diversity and recruitment. Furthermore, forest fragmentation has increased in pioneer species and weeds near edges (Laurance, 1998), and increased liana abundance (Laurance et al., 2001). The challenge of natural plant fragmentation has led to the tree landscaping which are of adequate benefit to the city dwellers and their environments. Thus, these urban trees are made up of different plants with different life forms.

Life form represents the sum of adaptive characters in a species, and thus is an expression of the agreement between a plant and its environment (Warming, 1909; Ewel and Bigelow, 1996); which shows that life form classification is ecologically relevant. Life form is also known to be single-character-based functional groups, despite the fact that at this level there are some similarities in life history and resource use that lend coherence to the categories (Solbrig, 1993); as the life forms seem to be as a result of evolutionary forces that lead to ecological convergence (Bocher, 1977; Ewel and Bigelow, 1996); sound knowledge of natural history to deduce relationships and dependencies among life-forms, and to predict the consequences of life-form loss and examining the patterns of life form distribution across the landscape and seeking differences in ecosystem functioning that accompany those patterns (Ewel and Bigelow, 1996).

Moreso, a life form is a group of plants having certain morphological features in common (Kuechler and Zonneveld, 1988)

Several life form classifications preserve essential features of Raunkiaer's system while incorporating additional detail likely to be of ecological relevance. Although, there is no universal agreement on one system of life form classification; but a minimal description of tropical forest plant life forms would have to include trees, herbs, epiphytes, climbers, shrubs, vines, and grasses as this would be conspicuous

classes of life form which continue to do justice to the amazing proliferation of morphologies in most equatorial tropical forests (Ewel and Bigelow, 1996). There are several less commonly studied urban plant life forms like shrubs and lianas, biodiversity and woody basal area for future plot comparisons (Muthuramkumar et al, 2006); despite the fact that biodiversity (flora and fauna) should be adequately preserved and promoted in urban residential areas. Preserving trees during development projects can protect native biodiversity. In the long run, costs for construction and maintenance of green areas are minimized when tree preservation occurs (Florgard and Dawe, 1988). The importance of biodiversity and its relevance to individual people's lives needs to be addressed. There is promise in community-based projects that foster an appreciation for the nature that is in city-dwellers' own backyards (Miller and Hobbs, 2002). Fostering a well-informed public may be the most important application of urban ecology (McKinney, 2002).

Life form composition studies are generally uncommon for tropical rainforests (Muthuramkumar et al, 2006) in which the Niger Delta region is inclusive, though Ewel and Bigelow (1996) have provided a global synthesis on which comparisons can be based. In addition, life form studies for urban plants in an organised society such as Government Reserve Areas are still very rare in the literature. Against this background, the present study is examining the comparative assessment of urban plant life form abundance in the capital cities of Niger Delta Region, Nigeria.

Materials and Methods

Study Area Description

The study was carried out in all the capital cities in the South-south region of Nigeria. These comprised Uyo in Akwa Ibom State, Yenagoa in Bayelsa State, Benin in Edo State, Port Harcourt in Rivers State, Asaba in Delta State, Calabar in Cross River State (Figure 1). The South south region is found within the Niger Delta of Nigeria; located between latitudes 5º 00'N and 6º 30'N and longitudes 5º 20'E and 9º 00'E; and with the Niger River is sitting directly on the Gulf of Guinea on the Atlantic Ocean in Nigeria. The study area features a tropical monsoon climate, designated by the Koppen climate classification as "Am", and it is mostly found in the southern part of the country. This climate is influenced by the monsoons originating from the South Atlantic Ocean, which is brought into the country by the maritime tropical air mass, a warm moist sea to land seasonal wind. Its warmth and high humidity gives it a strong tendency to ascend and produce copious rainfall, which is a result of the condensation of water vapour in the rapidly rising air (Park, 2004). The temperature ranges are almost constant throughout the year. The South-south region of Nigeria experiences heavy and abundant rainfall. These storms are usually conventional in nature due to the regions proximity, to the equatorial belt. The annual rainfall

received in this region is very high, usually above the 2,000 mm rainfall totals giving for tropical rainforest climates worldwide. Over 4,000 mm of rainfall is received in the coastal region of Nigeria around the Niger Delta area. Bonny town found in the coastal region of the Niger delta area in southern Nigeria receives well over 4,000 mm of rainfall annually (Geographical Alliance of Iowa, 2010). The geology includes a new threefold litho-stratigraphic subdivision comprising an upper sandy Benin formation, an intervening unit of alternating sandstone and shale named the Agbada formation, and a lower shaly Akata formation. These three units extend across the whole delta and each ranges in age from early Tertiary to Recent (Short and Staeuble, 1967; Durugbo et al., 2010). The south-south region is well drained with both fresh and salt water. The salt water is caused by the intrusion of seawater inland, thereby making the water slightly salty. Drainage of the study area is poor because of the presence of many surface water and heavy rainfall between 2000mm and 2400mm (Mmom and Fred-Nwagwu, 2013). The vegetation includes the rainforest, swampy forest and mangrove (Geographical alliance of Iowa, 2010). The primary economic activities in most rural communities in the south-south region include peasant farming, petty trading and fishing, shifting cultivation (Slash and burn), which involves cultivating a piece of land for a number of years and then abandoning it for a more fertile land is traditionally practised in the area. Some of the cash crops grown in the study area include oil palm (*Elaeis guineensis*), cacao (*Theobroma cacao*), cassava (*Manihot esculenta*) and rubber (*Herea brasiliensis*) (Enaruvbe and Atafo, 2015).

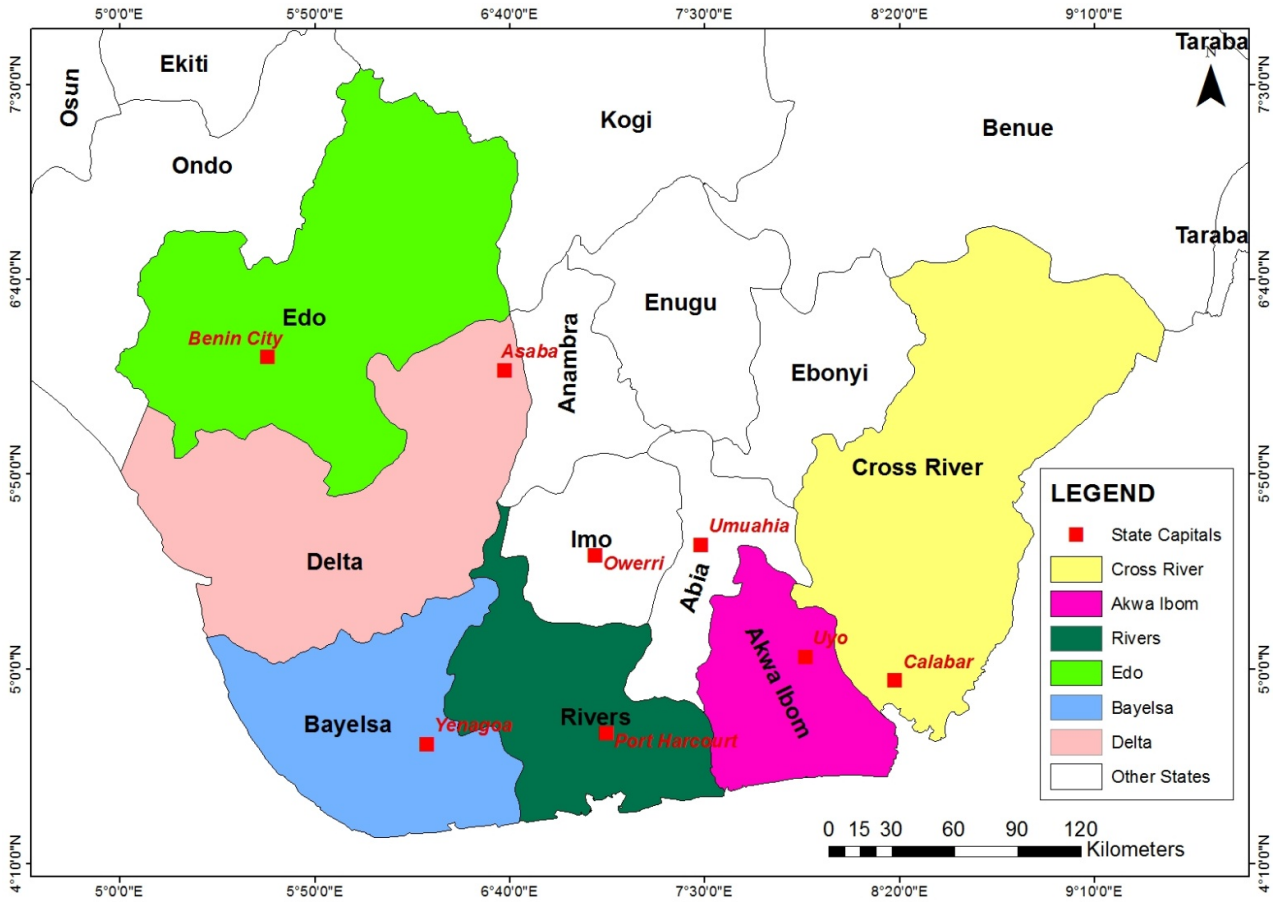

Figure 1. States in the South south region of Nigeria

Plant Species Composition and Life Forms

The plant species composition were the ones found along the sampled roads in each capital city's government residential areas (GRAs) and control sites (Table 1). Three major streets in the GRAs in each of the cities were sampled, whereby plants were identified and enumerated in order to understand their vegetation status. These roads were selected based on their high vegetation composition and status. The study applied transect methods whereby quadrats of 30 m by 200m used for the data collection were selected within each transect (street road). In other words several quadrats were established regularly in relation to the road length for each sampled street roads. Therefore, plant types were identified and enumerated on the spot with the help of a Taxonomist from the start to the end of the street road. Quadrats of 30m x 200m were laid on both sides of the road and a gap of 100m was created till the next quadrat and so on until the end of the street road. The data collection exercise was carried out between March and June, 2019 (for a period of four (4) months). The data collected on plant types and composition were used for the computation of life forms in each capital city. Both descriptive and

inferential statistics were used for the data analysis. The descriptive involved the use of frequency and percentages while inferential involved the use of analysis of variance (ANOVA) to test the significant difference in the life form abundance among the study locations. The analysis was computed using SPSS version 24.0.

Results and Discussion

Composition of Urban Plants Species

Table 1 presents the individual number of plant species present in each of the study locations and the proportion of presence. The results showed that 81 different plant species were found in the entire study locations in the South south region of Nigeria. From this total, 39.5% were present in Uyo, 22.2% were present in Yenagoa, 24.7% in Calabar, 37.0% in Asaba while 27.2% in Benin City and 49.4% in Port Harcourt. Similarly, a total number of 166 individual plant species were found in the entire study location in which Uyo had 19.2% (32), Yenagoa 10.8% (18); Calabar 12.0% (20); Asaba 18.1% (30) while Benin City had 15.7% (26) and Port Harcourt had 24.1% (40). In terms of the presence or appearance of plant species in the entire study area, it is found that plants were present in one location, two locations, three locations, four locations, five locations and all the six locations. Plant species such as *Agave sissalina, Albizia zygia, Anona nuricata, Araucaria columnaris, Caryotamono stachya, Cola pachycarpa, Hevea brazilensis, Imperata brasiliensis, Nerium oleander L., Senna alexandrina, Casuarina equisetifolia* and *Terminalia neotaliala* were found in only one of the locations and they occupied only 16.7% in the entire study locations. Furthermore, plant species like *Anacardium occidentale, Archontophoenix alexandrae, Bougainvillea glabra, Cycas revolute, Euphorbia kamerunica, and Hura crepitans* were found at most in two study locations and they occupied 33.3% in the study locations. However, *Alchornea cordifolia, Cycas circinalis, Cynodon dactylon, Ficus benjamina, Ixora coccinea, Persea Americana,*and *Roystonia regia* were found in three locations (50%). In a related development, *Citrus spp, Musa paradisiacal, Musa sapientum, Terminalia mantaly,*and *Thuja orientalis* are plant species that were found in only four locations recording 66.7% while *Carica papaya* and *Cocos nucifera* were found in only five locations recording 83.3%. Plant species such as *Delonix regia, Elaeis guineensis, Mangifera indica, Polyalthia longifolia, Psidium guajava* and *Terminalia catappa* were found in the six locations and thus they recorded 100% of appearance. In summary, the proportions of appearance in the locations showed that 56.8% of the plant species were found in one study location, 16.0% in two study locations, 9.9% in three locations, 7.4% in each of four and six locations while 2.5% in five study locations (Table 2).

Table 1. Plant Species and Proportion of Abundance (%)

S/N	Scientific Names	Common Names	UY	YE	CA	AS	BE	PH	Proportion (%)
1	*Agave sissalina*	Century plant				+			16.7
2	*Albizia zygia*	West Africa Walnut	+						16.7
3	*Alcalypha sp*	Bristly copperleaf						+	16.7
4	*Alchornea cordifolia*	Christmas bush		+		+		+	50.0
5	*Anacardium occidentale*	cashew	+		+				33.3
6	*Anona nuricata*	Sour sap	+						16.7
7	*Araucaria columnaris*	Caledonia pine				+			16.7
8	*Archontophoenix alexandrae*	King palm				+	+		33.3
9	*Axonopus compressus*	Savannah grass				+			16.7
10	*Azadirachta indica*	Neem Tree			+				16.7
11	*Bambusa vulgaris*	Bamboo		+		+	+	+	66.7
12	*Bougainvillea glabra*	Paper flower				+	+		33.3
13	*Caesalpinia pulcherrima*	Pride of Barbados/Peacock Flower	+		+			+	50.0
14	*Carica papaya*	Pawpaw	+	+		+	+	+	83.3
15	*Caryotamono stachya*	Fishtail palm						+	16.7
16	*Cassia sieberiana*	Drumstick Tree			+				16.7
17	*Casuarina equisetifolia*	Whistling Pine			+				16.7
18	*Citrus spp*	Orange Tree	+	+			+	+	66.7
19	*Cocos nucifera*	Coconut	+	+	+	+		+	83.3
20	*Cola pachycarpa*	Kolanut						+	16.7
21	*Croton sp*	Variegated plant						+	16.7
22	*Cuphea california Torr.*	Cigar plant	+						16.7
23	*Cycas circinalis*	Queen Sago		+		+	+		50.0
24	*Cycas revoluta*	Sago Palm	+			+			33.3
25	*Cynodon dactylon*	Bermuda Grass		+		+	+		50.0
26	*Delonix regia*	Flame tree	+	+	+	+	+	+	100.0
27	*Dracaena sp*	Dragons Tree				+		+	33.3
28	*Duranta repens*	Sky flower			+				16.7
29	*Elaeis guineensis*	Oil Palm	+	+	+	+	+	+	100.0
30	*Erythrophlem ivorense*	Poisonous Plant	+						16.7
31	*Eucalyptus citriodora*	Lemon- scented Gum			+				16.7
32	*Eugenia sp*	Flowering plant						+	16.7
33	*Euphorbia kamerunica*	Spurge					+	+	33.3
34	*Ficus benjamina*	Weeping fig	+			+		+	50.0
35	*Ficus benjamina L.*	Variegated green	+						16.7

		ficus							
36	*Ficus benjamina Nutt.*	Yellow ficus	+						16.7
37	*Ficus carica*	Green Ficus	+						16.7
38	*Ficus exasperata*	Sand paper tree			+				16.7
39	*Ficus nitida*	Ficus plant	+			+			33.3
40	*Ficus retusa*	Cuban-Laurel						+	16.7
41	*Gmelina arborea*	Gmelina Tree					+	+	33.3
42	*Hesperocallis undulata*	Desert lily				+			16.7
43	*Hevea brazilensis*	Para rubber tree						+	16.7
44	*Hibiscus arnottianus*	White Hibiscus	+						16.7
45	*Hura crepitans*	Sandbox Tree	+		+				33.3
46	*Imperata brasiliensis*	Brazilian satin tail				+			16.7
47	*Ixora coccinea*	Flame of the woods				+	+	+	50.0
48	*Lantana camara*	Lantana						+	16.7
49	*Mangifera indica*	Mango	+	+	+	+	+	+	100.0
50	*Moringa oleiferaLam*	Moringa						+	16.7
51	*Murraya paniculata*	Mock Lime						+	16.7
52	*Musa paradisiaca*	Plantain	+	+			+	+	66.7
53	*Musa sapientum*	Banana	+	+			+	+	66.7
54	*Mussaenda sp*	Ashanti blood or red flag bush						+	16.7
55	*Nerium oleander L.*	Oleander	+						16.7
56	*Pennisetum purpureum*	Elephant grass				+	+		33.3
57	*Pentaclethra macrophylla*	African oil bean					+		16.7
58	*Persea americana*	Avocado Pear	+				+	+	50.0
59	*Pinus caribaea*	Whistling pine						+	16.7
60	*Pinus palustris*	Long leaf pine			+				16.7
61	*Plumeria rubra*	Nosegay			+			+	33.3
62	*Polyalthia longifolia*	Masquerade Tree	+	+	+	+	+	+	100.0
63	*Psidium guajava*	Guava	+	+	+	+	+	+	100.0
64	*Pterocarpus santalinoides*	Mututi plant						+	16.7
65	*Ralphia hookeri*	Palm	+						16.7
66	*Ravenala madagascarensis*	Traveller's tree or traveller's palm,						+	16.7
67	*Rhizophora mangus*	Paper Flower	+				+		33.3
68	*Roystonia regia*	Florida royal palm				+	+	+	50.0
69	*Sanseviera trifasciata*	Mother in-law's tongue				+			16.7
70	*Senna alexandrina*	Egyptian senna				+			16.7
71	*Senna siamea*	Yellow cassia						+	16.7
72	*Spondias cytherea*	June plum		+			+		33.3

73	*Syagrus romanzoffiana*	Queen Palm	+						16.7
74	*Tectona grandis*	Teak			+				16.7
75	*Terminalia catappa*	Indian-Almond	+	+	+	+	+	+	100.0
76	*Terminalia irvorensis*	Country-almond or Indian- almond						+	16.7
77	*Terminalia mantaly*	Madagascar Almond	+	+		+	+		66.7
78	*Terminalia neotaliala*	-			+				16.7
79	*Thuja orientalis*	Northern white-cedar		+		+	+	+	66.7
80	*Vernonia amygdalina*	Bitterleaf						+	16.7
81	*Vossia cuspidata*	Grass	+						16.7
Total	Total		32	18	20	30	26	40	166
			19.2	10.8	12.0	18.1	15.7	24.1	

Table 2. Summary of Proportion of Abundance of Urban Plants

Number of Presence of Plant Species in each Study Location	Frequency	Percentage (%)
One study location (16.7%)	46	56.8
Two study locations (33.3%)	13	16.0
Three study locations (50.0%)	8	9.9
Four study locations s (66.7%)	6	7.4
Five study locations (83.3%)	2	2.5
All study locations (100.0%)	6	7.4
Total	81	100.0

Spatial Comparative Assessment of Urban Plant Life Form

Table 3 presents the summary of life forms discovered in the entire study area. It revealed that three life forms were recorded and these included the tree, shrub and herb. Of the total life per plant species, 56.8% were trees, 34.6% were shrubs while 8.6% were herbs. Similarly, for the individual plant life form having a total of 166, 59.6% were trees, 34.3% were shrubs and 6.1% were herbs (Table 4).

The distribution per study location of the life forms in the South south Region of Nigeria is presented in Table 5 showing that trees were highest (22.2%) in both Uyo and Port Harcourt while Calabar recorded 19.2% and the least was recorded in Yenagoa with 9.1%. In terms of shrub, it is shown that the highest (31.6%) was recorded in Port Harcourt while each of Asaba and Benin City recorded 19.3% and the least was found Calabar recording 1.8%. Results also showed that Asaba recorded the highest herbs with 50.0%, while followed by Uyo and Benin with each recording 20.0% and 10% was recorded in Yenagoa.

Table 3. Individual Urban Plant Life Form Composition

Life Form	Frequency	Percentage (%)
Tree	46	56.8
Shrub	28	34.6
Herb	7	8.6
Total	81	100.0

Table 4. General Urban Plant Life Form Composition

Life Form	Frequency	Percentage (%)
Tree	99	59.6
Shrub	57	34.3
Herb	10	6.1
Total	166	100.0

Table 5. Urban Plant Form Composition per Study Location

Location	Tree	Percentage (%)	Shrub	Percentage (%)	Herbs	Percentage (%)	Total	Percentage (%)
Uyo	22	22.2	8	14.0	2	20.0	32	19.3
Yenagoa	9	9.1	8	14.0	1	10.0	18	10.8
Calabar	19	19.2	1	1.8	0	0.0	20	12.0
Asaba	14	14.1	11	19.3	5	50.0	30	18.1
Benin	13	13.1	11	19.3	2	20.0	26	15.7
Port Harcourt	22	22.2	18	31.6	0	0.0	40	24.1
Total	99	100.0	57	100.0	10	100.0	166	100

Variation in the Life Forms among the Study Locations

The variation in the life form abundance among the study locations is displayed in Table 6 and Table 7. There was a significant variation in the life form abundance among the study locations (F=3.935; p=0.002). The least squared difference analysis showed that there was significant variation in the life form abundance between Uyo and Benin (p=0.038); Yenagoa and Calabar (p=0.012); Calabar and Asaba (p=0.000); Calabar and Benin (p=0.000); and Port Harcourt and Calabar (p=0.018). This shows that the abundance of life form depends on the proximity of each of the study locations. This could be seen in the analysis that the abundance of life form between the neighbouring capital city showed no significant variation.

Table 6. Analysis of Variance (ANOVA) of Life Forms among the Locations

Life Form					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.349	5	1.470	3.935	.002
Within Groups	60.888	163	.374		
Total	68.237	168			

Table 7. Multiple Comparisons Using Least Squared Difference

(I) Study Locations	(J) Study Locations	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Uyo	Yenagoa	-.18056	.18007	.317	-.5361	.1750
	Calabar	.32500	.17421	.064	-.0190	.6690
	Asaba	-.32500*	.15532	.038	-.6317	-.0183
	Benin	-.34914*	.15670	.027	-.6586	-.0397
	Port Harcourt	-.07500	.14495	.606	-.3612	.2112
Yenagoa	Uyo	.18056	.18007	.317	-.1750	.5361
	Calabar	.50556*	.19857	.012	.1135	.8977
	Asaba	-.14444	.18222	.429	-.5043	.2154
	Benin	-.16858	.18339	.359	-.5307	.1936
	Port Harcourt	.10556	.17347	.544	-.2370	.4481
Calabar	Uyo	-.32500	.17421	.064	-.6690	.0190
	Yenagoa	-.50556*	.19857	.012	-.8977	-.1135
	Asaba	-.65000*	.17643	.000	-.9984	-.3016
	Benin	-.67414*	.17765	.000	-1.0249	-.3234
	Port Harcourt	-.40000*	.16738	.018	-.7305	-.0695
Asaba	Uyo	.32500*	.15532	.038	.0183	.6317
	Yenagoa	.14444	.18222	.429	-.2154	.5043
	Calabar	.65000*	.17643	.000	.3016	.9984
	Benin	-.02414	.15916	.880	-.3384	.2901
	Port Harcourt	.25000	.14761	.092	-.0415	.5415
Benin	Uyo	.34914*	.15670	.027	.0397	.6586
	Yenagoa	.16858	.18339	.359	-.1936	.5307
	Calabar	.67414*	.17765	.000	.3234	1.0249
	Asaba	.02414	.15916	.880	-.2901	.3384
	Port Harcourt	.27414	.14906	.068	-.0202	.5685
Port Harcourt	Uyo	.07500	.14495	.606	-.2112	.3612
	Yenagoa	-.10556	.17347	.544	-.4481	.2370
	Calabar	.40000*	.16738	.018	.0695	.7305
	Asaba	-.25000	.14761	.092	-.5415	.0415
	Benin	-.27414	.14906	.068	-.5685	.0202

*. The mean difference is significant at the 0.05 level.

Discussion of Findings

Findings showed that trees dominated the life forms in the study locations. This is similar to study of Pasion et al. (2018) which deals trees represent community composition of other plant life-forms, but not their diversity, abundance or responses to fragmentation. The study negated the works of Dogra *et*

al. (2009) and Eludoyin (2016) which reported that vegetation life form in the tropics is dominated by shrubs though under a single plantation of different ages. The variation in the life form abundance is also informed by kinds of plant species dominating a particular area. However, certain factors can be identified to influence the survival of some life forms. Freiberg & Gottsberger (2001) and Gregorio (2005) reported that soil water content and air micro climate can determine the abundance of life form in any region.

The domination of tree life form could affect the survival of other life forms like shrubs, herbs and grasses. Gregorio (2001) reported that the dominance of a life form is based on the "uppermost canopy" level, ranging from trees to Shrubs to Forbs/Graminoids. Gregorio (2001) further reported that this main condition for uppermost canopy has to be considered in conjunction with the sub-condition cover, ranging from closed or open to sparse in other words, the uppermost canopy concept is only valid if the dominant life form has a cover either closed, open or closed to open. If the life form is sparse then the dominance goes to another life form that has a closed or open cover.

It is also discovered that abundance of life form could be affected by climate and this depends on the proximity to the equator. Ewell and Bigelow (1996) reported that within the tropics, precipitation is a major determinant of life-form distribution which depicts that the general trend is one of greater life-form richness with increasing rainfall. If, on the other hand, Raunkiaer's system, with its emphasis on adaptations to harsh environments, is used, life-form richness increases with aridity. Moreso, it is reported that epiphytes are more affected than any other life-form group, and there is a strong correlation between annual precipitation and contribution of epiphytes to species richness. Also, altitude affects the changes in life-form depending on the temperature, mist and rainfall levels which tend to change with change in the altitude. In the humid tropics, temperature drops more or less predictably, at a rate of 5.5 to 6.0 °C per 1000 m. Atmospheric moisture, on the other hand, is more complex. Orographic uplift of incoming air masses often results in an increase in rainfall with elevation. Furthermore, at the lifting condensation level (often in the range of 600 to 2000 m), forests are bathed in mist. Epiphytes, both vascular and nonvascular, commonly reach their greatest abundance and diversity in montane cloud forest (Gradstein and Pocs, 1989).

Conclusion and Recommendations

The urban plant life form abundance in the capital cities of South south region of Nigeria varied in which the highest was found in Port Harcourt and the least in Yenagoa. However, the majority of the life

form was trees. It is therefore recommended that tree planting and conservation should be practised especially in the areas with less urban plant life form in the South south region of Nigeria.

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