Global Scientific JOURNALS

GSJ: Volume 12, Issue 5, May 2024, Online: ISSN 2320-9186
www.globalscientificjournal.com

Relationship between Plant Diversity and Similarity Index between Uyo and Yenagoa Cities of South South Region, Nigeria

Ita-Nya E.P.
Niger Delta Development Commission, Port Harcourt, Rivers State, Nigeria

Abstract

The study examined the relationship between species diversity and similarity index between uyo and Yenagoa Cities of South south Region, Nigeria. The study established quadrats of 30mx200m along road (transects) in GRAs of Uyo City, Akwa Ibom State and Yenagoa City, Bayelsa State labelled as sampled sites and a quadrat of 100mx100m were established as control sites (secondary forest) at a minimum of 300m from the sampled sites. Descriptive statistics were employed to analyse the data. Findings showed that the species diversity of plants is higher in Uyo (0.895) that Yenagoa (0.658). Furthermore, the similarity index between Sites 1 and 2 in Uyo was 23.8% and in Yenagoa was 35.7%. The similarity Index between Sites 1 and 3 in Uyo was 20% while in Yenagoa was 29.4%. The similarity index between Sites 2 and 3 in Uyo was 4% and 40% in Yenagoa. The study is concluded that the species diversity in Uyo is higher than that of Yenagoa while the similarity index is lower in Uyo than that of Yenagoa. It is thus recommended that the protection of plants especially in the urban settings should be highly established to reduce the level of similarity in the plant species and increase the level of species diversity.

Keywords: Plant diversity, Similarity index, Secondary forest, Descriptive statistics, Quadrat

Introduction

According to the Convention on Biological Diversity (1992), biodiversity is the variability of living things from all sources, such as terrestrial, marine, and other aquatic ecosystems, as well as the ecological complexes that they are a part of. This includes diversity within species, between species, and within ecosystems. In addition, although maintaining the diversity of forest ecosystems has long been necessary, biodiversity has gained popularity in discussions about sustainability during the past 10 years (Swindel et al., 1994; Ariyo, 2020).

The variety of life on Earth, from genes and microbes to complete ecosystems like forests or coral reefs, is known as biological diversity. The outcome of 4.5 billion years of evolution, with growing human impact, is the biodiversity that exists today. The web of life that provides us with food, water, medicine, a stable climate, and economic progress is made up in large part by biodiversity. Nature is the source of more than half of the world GDP. For their livelihoods, more than 1 billion people depend on trees. Furthermore, the water and land absorb almost half of all carbon emissions. However, the natural world is in peril. There is a threat to the extinction of up to one million species, many within a few decades.

Deforestation is converting irreplaceable ecosystems, such as sections of the Amazon rainforest, from carbon sinks to carbon sources. Furthermore, 85% of wetlands—such as mangrove swamps and salt marshes, which are known to absorb significant amounts of carbon—have vanished (Ariyo, 2020).

Species diversity is one of the most significant indices used for the assessment of ecosystems at various scales, and species diversity is generally the focus of biodiversity measurement (Ardakani, 2004). Numerous indices, including the Shannon index and the number of species per unit area (species richness), can be used to study local diversity. These serve as markers of the degree of intricacy of the communities being studied and offer details on the system's ability to maintain homeostasis in the face of unanticipated unforeseen environmental changes (Magurran, 1988).

For millennia, the core of vegetation research has been the identification of distinct plant communities, with an emphasis on the distribution, composition, and categorization of plant communities (Kashian, 2003). An assembly of functionally related species populations that coexist in space and time is referred to as a plant community (Magurran, 1988). Indicator species together with a unique floristic composition are used to distinguish between different plant communities. Since the latter is one of the primary characteristics that set a community apart, any reduction in biodiversity would inevitably change the characteristics of the group (Mishra et al., 2004). According to Groombridge and Jenkins (2004), biodiversity comprises genetic diversity, species richness, and ecological diversity. It is assessed using taxonomic inventories within designated regions and is predicated on the idea that these are interrelated.

Migration, environmental adaptability, and the ways in which these factors influence the environment itself determine the diversity of species found in a given geographic region (Ariyo, 2020). The preservation of living things, including the wise use of soils and other natural resources, is the focus of biological conservation (Stohlgren, 1994).

The primary cause of biodiversity loss is still human land usage, particularly for food production. More than 70% of all ice-free territory has already undergone changes due to human activities (United Nations, 2024). Certain animal and plant species risk becoming extinct when their habitat is destroyed for agriculture. However, the loss of biodiversity is increasingly being attributed to climate change. Globally, freshwater, terrestrial, and marine ecosystems have all been impacted by climate change.

The first extinctions triggered by climate change have occurred as a result of the loss of native species, a rise in illnesses, and mass plant and animal mortality (United Nations, 2024). With far-reaching effects on ecosystems, rising temperatures on land have compelled many plants and animals to relocate to higher latitudes or altitudes, with many of them heading towards the poles. With each degree of global warming, there is a greater chance of species extinction (United Nations, 2024). The diversity indexes that scientists employ on a daily basis and the common concept of biodiversity which is the variety of life are not aligned. This discrepancy is significant since biodiversity preservation is a top priority for the whole world. One of the terms that is frequently used interchangeably with diverse meanings in scientific and non-scientific situations is diversity (Adams et al. 1997).

Distance or some measure of the dissimilarity of the resources in question," is "associated with the idea of diversity," according to the Organization for Economic Co-operation and Development's handbook on biodiversity for policy makers (OECD 2002). Nevertheless, this element is completely disregarded by the traditional diversity metrics. This unfortunate state of affairs may arise from a lack of appropriate diversity measures that account for the many differences across species, or from a lack of knowledge on their use; thus, the measure is known as similarity-sensitive. The quadratic entropy of Rao is the most well-known similarity-sensitive diversity measure (1982). Even though it's getting more attention, this is still a little player.

Though Jost's (2009) research debunks the myth, theoretical ecologists may have been reluctant to add new diversity indices because of the widespread perception that the abundance of similarity-insensitive indices forms an impenetrable jungle (Ricotta, 2005).

Since microbial taxonomy is so complicated, microbial ecologists have really known for a long time that similarity or distance measurements are necessary for quantifying diversity (Mills and Wassel, 1980). The application of our measurements to microbial populations is demonstrated. A more realistic representation of reality is obtained when species similarity is taken into consideration (Leinster and Cobbold, 2012). It also reveals the implicit presumptions that underlie the naïve model. Our more sophisticated method may be adjusted to the specific

requirements of the user since it can measure many forms of variety, such as functional, morphological, genetic, and so on. One formula replaces a multitude of diversity indices that are both sensitive and insensitive to species similarity (Leinster and Cobbold, 2012).

There are several ecological studies that link plant diversity and similarity index; however, only a small number of these research have shown a correlation between the two, despite plant diversity being a crucial component of ecology. As a result, the current study looked at the connection between plant diversity and similarity index between Yenagoa, Bayelsa State, and Uyo, Akwa Ibom State, both in Nigeria's South South Region.

Materials and Methods

Study Area Description

The study was carried out in Uyo, Akwa Ibom and Yenagoa, Bayelsa States in the South south region of Nigeria (Figure 1). The South south region which is found within the Niger Delta of Nigeria is located between latitudes 5º 00'N and 6º 30'N and longitudes 5º 20'E and 9º 00'E.

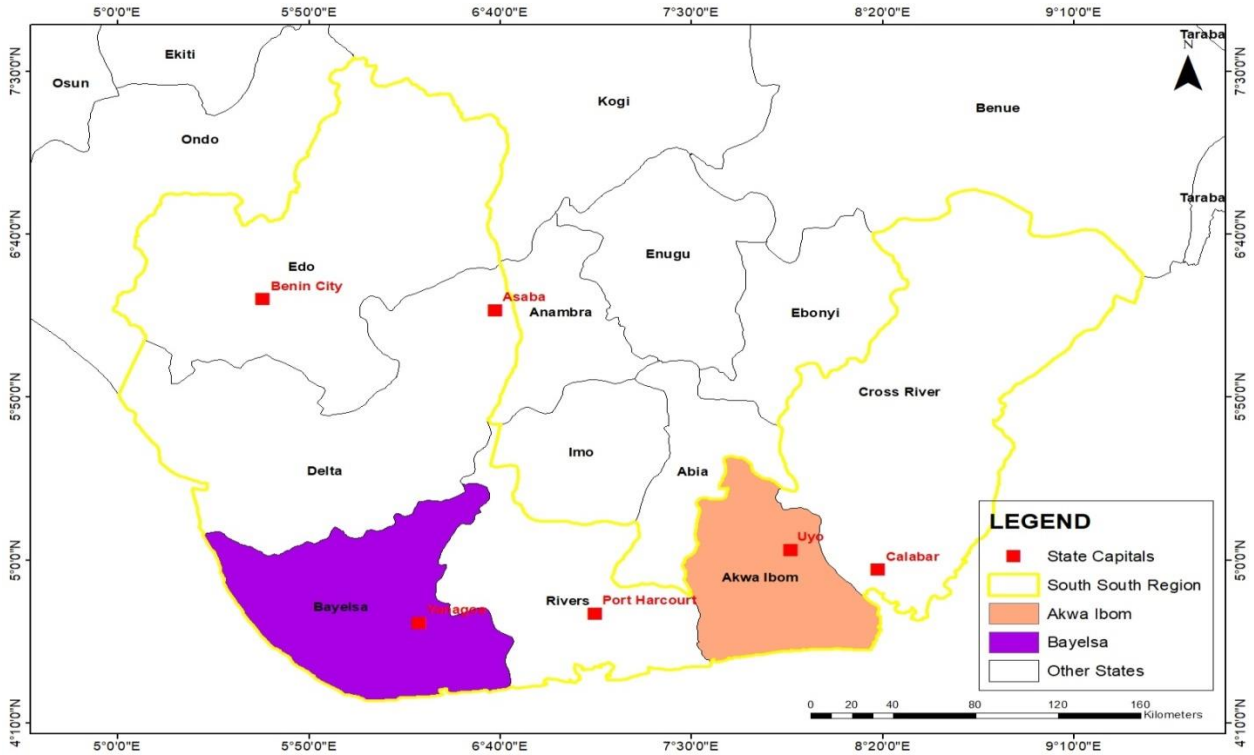

Figure 1. Akwa Ibom and Bayelsa States in the South south region of Nigeria

The South-south region 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 (Britanica, 2014). 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 (78.7 in) 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 lithostratigraphic 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).

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).

Plant Species Identification and Enumeration

The vegetation makes up of sampled roads in each major urban centres' government residential areas (GRAs) and control sites (Table 1). The study made use of (3) major street roads in the GRAs in each major cities, 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, while the control sites were selected based on the diverse species of plants can be enumerated and used as basis of comparison for the research. The control sites are

the primary or secondary forest, nature parks or any other relatively undisturbed forests in each study area. The control sites were located at a minimum of 300m away from the sampled roads (sites). 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 (transect). 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 (Figure 2). On the other hand, the control sites plant species were identified within selected secondary forest using also quadrat methods.

Five (5) 30m x 30m randomly selected quadrats were delimited within quadrats of 100m x 100m laid within each control sites for the collection of data on the vegetal composition and the plant species types. The data collected on plant types and composition were used for the computation of analytical vegetation features such as species diversity and similarity index which followed standard phyto-sociological methods. The identification of plant was also carried out with the help of a Taxonomist from the University of Port Harcourt. The plants that were not identified *in situ* were taken to the Herbarium in the University of Port Harcourt for Proper Identification. The species diversity index (H') of identified plant were computed using Simpson's index (Simpson, 1949). The formula for computing Simpson's diversity index (D) is:

$$\mathbf{D}= \sum_{i=1}^{s} \frac{ni\,(ni-1)}{N(N-1)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(Equ. 1)}$$

Where,

n*i*= the number of individuals of *i*th species

N = the total number of individuals.

The value of **D** ranges from 0 to 1. With this index, 0 represents maximum diversity and, 1, no diversity. That is, the bigger the value the lower the diversity. To remove the inverse relationship between Simpson's index and actual diversity of a community, the diversity index (**D'**) is subtracted from 1. The value also ranges from 0 to 1 but the interpretation is the higher the value, the higher the diversity and *vice versa* (Chima and Omokhua, 2011).

Jaccard Index of Similarity Coefficient is a range between 0% and 100% (higher percentages indicate more similarity between two populations or community of species). It is a measure of the size of intersection of two groups of species divided by the size of union of the two group of species population (Tan, Steinbach and Kumar, 2005).

It is given as: $J(X,Y) = X \cap Y / X \mathring{U} Y * 100$. . . . . (Equ. 2)

J= Jaccard Index; X= Population group/set 1; Y= Population group/set 2

J index = Number in both sets (size of intersection)/ Number in either sets (size of union) X 100

Steps: 1. Count the number of members which are shared between both sets

2. Count the total number of members in both sets (shared and un-shared)

3. Divide the number of shared members (1) by total number of members (2)

4. Multiply the number determined in (3) by 100

Descriptive statistics were employed for the data analysis. The analysis was computed using SPSS version 24.0.

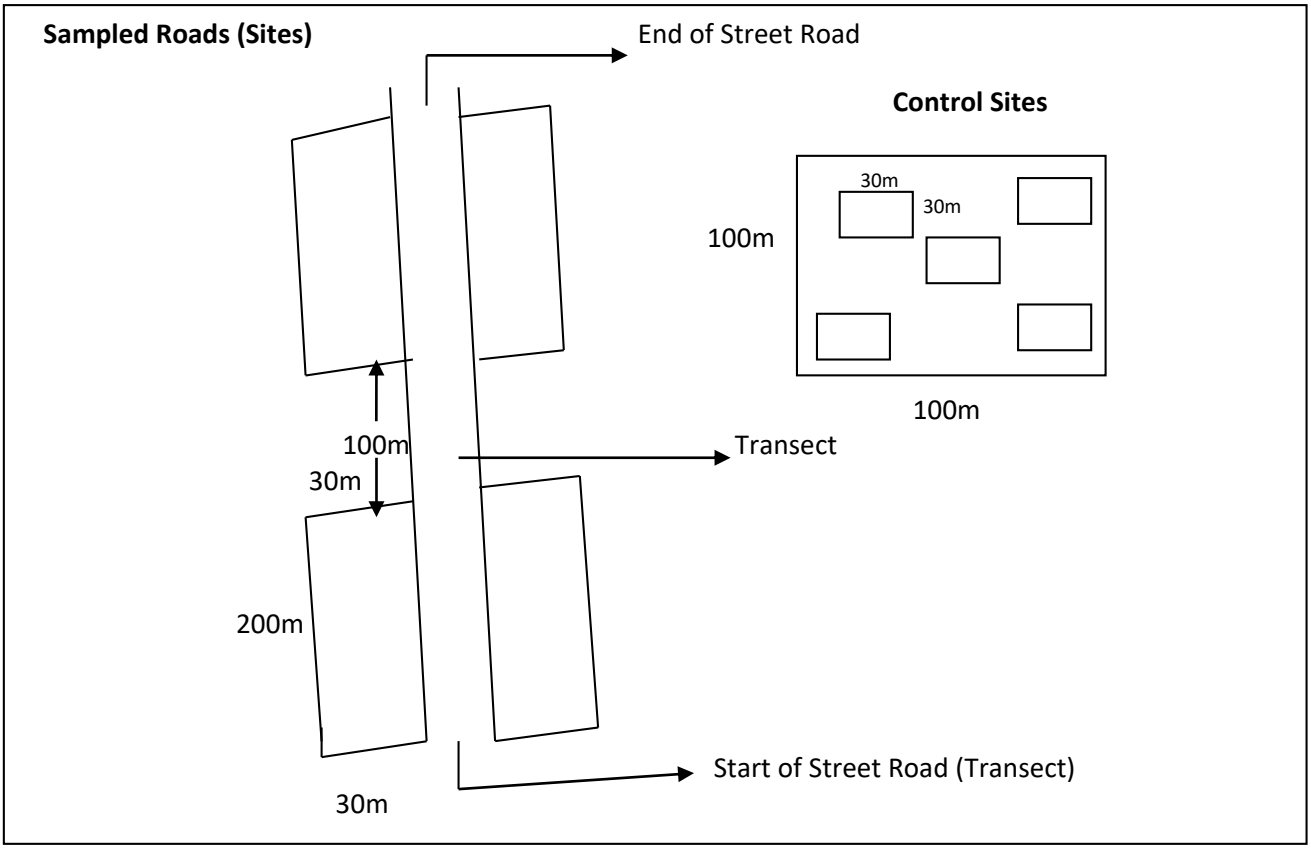

Figure 2: Method of collection of plant species types and composition in the study area

Table 1: Study Areas/Sampled Streets/Roads Names and Locations

State	Capital Cities	GRA	Selected Street name/Sampled Sites	Location	
				Northings	Eastings
Akwa Ibom	Uyo	Ewet Housing	Godwin Abe/1	5.01188^0	7.95012^0
			G-Lane/2	5.01677^0	7.94520^0
			Lagos Street/3	5.01281^0	7.94528^0
Bayelsa	Yenagoa	Otitio GRA	Biogbolo/1	4.93921^0	6.32203^0
			Erepa/2	4.93361^0	6.32187^0
			Otitio/3	4.93638^0	6.31922^0
Control Sites					
Akwa Ibom	Uyo (Secondary Forest)			5.05422^0	7.92774^0

Bayelsa	Yenagoa (Okordia clan secondary forest)	5.14036^0	6.44856^0

Results and Discussions

Species Diversity between Sampled Sites and Control Sites in Uyo, Akwa Ibom State

The species diversity of identified plants between the sampled sites and control site in the study area was displayed on Table 2 and Table 3. The results showed that species diversity was 0.895 under the sampled sites and 0.932 under the control site. Thus, the diversity of identified plants species types was higher under the control sites in Uyo, Akwa Ibom State.

Table 4.37: Plant Species Diversity for all Sampled Sites (roads) in Uyo

S/N	Species Types	ni	ni-1	ni(ni-1)
1	*Albizia zygia*	2	1	2
2	*Anacardium occidentale*	3	2	6
3	*Anona nuricata*	3	2	6
4	*Caesalpinia pulcherrima*	4	3	12
5	*Carica papaya*	22	21	462
6	*Citrus spp*	6	5	30
7	*Cocos nucifera*	13	12	156
8	*Cuphea california Torr.*	3	2	6
9	*Cycas revoluta*	4	3	12
10	*Delonix regia*	7	6	42
11	*Elaeis guineensis*	6	5	30
12	*Erythrophlem ivorensis*	4	3	12
13	*Ficus benjamina*	7	6	42
14	*Ficus benjamina Nutt.*	5	4	20
15	*Ficus carica*	4	3	12
16	*Ficus nitida*	4	3	12
17	*Hibiscus arnottians*	7	6	42
18	*Hura crepitan*	3	2	6
19	*Mangifera indica*	17	16	272
20	*Musa parasidiaca*	9	8	72
21	*Musa sapientum*	21	20	420
22	*Nerium oleander L.*	4	3	12
23	*Persea americana*	2	1	2
24	*Polyalthia longifolia*	31	30	930
25	*Psidium guajava*	19	18	342
26	*Ralphia hookeri*	6	5	30
27	*Rhizophora mangus*	3	2	6
28	*Spondiae cythera*	2	1	2
29	*Syagrus romanzoffiana*	4	3	12
30	*Terminalia cattapa*	6	5	30

31	*Terminalia mantaly*	3	2	6
32	*Vossia cuspidata*	89	88	7832
		N= 323 N(N-1) =104006		$\Sigma n_i(n_i -1)$= 10878 D=0.105

Diversity = 1-D = 1- 0.105 = 0.895

Table 2: Plant Species Diversity for Control Sites in Uyo

S/N	Species Types	ni	ni-1	ni(ni-1)
1	*A. laxiflora*	6	5	30
2	*Acioa barteri*	3	2	6
3	*Albizia adianthifolia*	3	2	6
4	*Alchornea cordifolia*	5	4	20
5	*Alstonia boonei*	7	6	42
6	*Anacardum occidentalis* Linn	3	2	6
7	*Anthocleista vogelii*	4	3	12
8	*Anthonotha macrophylla*	2	1	2
9	*Antiaris africana*	3	2	6
10	*Bambusa vulgaris*	4	3	12
11	*Baphia nitida*	5	4	20
12	*Bombax buonopozense*	2	1	2
13	*Centrosema pubescens*	42	41	1722
14	*Chromolaena odorata*	28	27	756
15	*Cleistopholis patens*	22	21	462
16	*Cola acuminate*	33	32	1056
17	*Combretum albidum*	27	26	702
18	*Costus afer*	35	34	1190
19	*Dracena sp. Linn.*	4	3	12
20	*Elaeis guineensis*	12	11	132
21	*Ficus exasperata*	7	6	42
22	*Garcinia manii*	2	1	2
23	*Harungana madagascariensis*	8	7	56
24	*Leea guineensis*	6	5	30
25	*Musanga cecropioides*	11	10	110
26	*Myrianthus arboreus*	7	6	42
27	*Pterocarpus mildbraedii*	2	1	2
28	*Raphia spp*	5	4	20
29	*Senna alata*	9	8	72
30	*Terminalia ivorensis*	3	2	6
31	*Urena lobata*	2	1	2
		N=312 N(N-1) = 97032		$\Sigma n_i(n_i -1)$ = 6580 D= 0.068

Diversity = 1-D = 1- 0.068 = 0.932

Species Diversity between Sampled Sites and Control Site in Yenagoa, Bayelsa State

The species diversity of identified plants between the sampled sites and control sites in Yenagoa was displayed on Table 4 and Table 5. The results showed that species diversity was 0.658 under the sampled sites and 0.946 under the control sites. Thus, the diversity of identified plants species types was higher under the control sites in Yenagoa, Bayelsa State..

Table 4: Plant Species Diversity for Sampled Sites in Yenagoa

S/N	Species Types	ni	ni-1	ni(ni-1)
1	*Alchornea cordifolia*	12	11	132
2	*Bambusa vulgaris*	5	4	20
3	*Carica papaya*	21	20	420
4	*Citrus spp*	4	3	12
5	*Cocos nucifera*	13	12	156
6	*Cycas cecenalis*	13	12	156
7	*Cynodon dactylon*	282	281	79242
8	*Delonix regia*	16	15	240
9	*Elaeis guineensis*	10	9	90
10	*Mangifera indica*	17	16	272
11	*Musa paradisica*	19	18	342
12	*Musa sapientum*	8	7	56
13	*Polyalthia longifolia*	18	17	306
14	*Psidium guajava*	26	25	650
15	*Spondias cethera*	3	2	6
16	*Terminalia cattapa*	4	3	12
17	*Terminalia mantaly*	17	16	272
18	*Thuja sinensis*	3	2	6
		N= 491 N(N-1) = 240590		$\Sigma n_i(n_i - 1)$ =82390 D =0.342

Diversity = 1-D = 1- 0.342 = 0.658
Source: Researcher's Fieldwork, 2019

Table 5: Plant Species Diversity for Control Sites in Yenagoa

S/N	Species Types	ni	ni-1	ni(ni-1)
1	*Alchornea cordifolia*	4	3	12
2	*Alstonia boonei*	5	4	20
3	*Alstonia congesis*	4	3	12
4	*Anthocleistii vogelii*	4	3	12
5	*Anthonotha macrophylla*	3	2	6

6	*Bambusa vulgaris*	13	12	156
7	*Bridella micrantha*	3	2	6
8	*Cleistopholis patens*	3	2	6
9	*Combretum micranthia*	11	10	110
10	*Elaeis guineensis*	22	21	462
11	*Endodesima calophylloides*	5	4	20
12	*Erasmopatha microcapa*	4	3	12
13	*Garcinia kola*	3	2	6
14	*Guarea cedrata*	8	7	56
15	*Harungana madagascariensis*	3	2	6
16	*Hevea brasiliensis*	7	6	42
17	*Lophira Alata*	4	3	12
18	*Militia aboensis*	2	1	2
19	*Musanga cecropioides*	5	4	20
20	*Newbouldia laevis*	2	1	2
21	*Picanthus agolensis*	6	5	30
22	*Psidium guajava*	10	9	90
23	*Raphia manii*	4	3	12
24	*Raphia vinifera*	8	7	56
25	*Rauvolfia vomitoria*	4	3	12
26	*Rhizophora racemosa*	2	1	2
		N=149 N(N-1) = 22052		$\Sigma n_i(n_i - 1)$ =1182 D= 0.054

Diversity = 1-D = 1- 0.054 = 0.946

Similarity Index Computed for Identified Plant Species in Sampled Sites

The similarity index computed for identified plant species in sampled sites were displayed on Table 6. The distribution revealed that similarity index was low in all sampled sites when compared within each study site. The percentage ranges were between 0% and 40% and the highest similarity index were experience in Yenagoa study site between sampled sites 2 and 3. However, similarity index computed for all study sites in sampled sites 1, 2 and 3 were: Uyo recorded 23.8%, 20% and 4% between sample sites 1 and 2, sampled sites 1 and 3 and sampled sites 2 and 3 respectively; Yenagoa recorded 35.7%, 29.4% and 40% respectively. The study discovered that the similarity index within each study site were low as none of the study sites recorded similarity index of at least 50% (mid-way point) to show that the sets or groups share half of the members.

Table 6: Similarity Index among sampled sites in the Study Area

Sampled Site 1 (X) and Sampled Site 2 (Y)	**Sampled Site 1 (X) and Sampled Site 3 (Y)**	**Sampled site 2 (X) and Sampled site 3 (Y)**
Uyo		

X ∩ Y = 5	X ∩ Y = 5	X ∩ Y = 1
X ∪ Y = 21	X ∪ Y = 25	X ∪ Y = 25
X ∩ Y / X ∪ Y * 100	X ∩ Y / X ∪ Y * 100	X ∩ Y / X ∪ Y * 100
J = 23.8%	J = 20%	J = 4%
Yenagoa		
X ∩ Y = 5	X ∩ Y = 5	X ∩ Y = 6
X ∪ Y = 14	X ∪ Y = 17	X ∪ Y = 15
X ∩ Y / X ∪ Y * 100	X ∩ Y / X ∪ Y * 100	X ∩ Y / X ∪ Y * 100
J = 35.7%	J = 29.4%	J = 40%

J = Similarity Index

Relationship between Species Diversity and Similarity Index in Uyo and Yenagoa

The relationship between species diversity and similarity index in Uyo and Yenagoa through scatter diagram are expressed in Figures 3, 4, 5, 6, 7 and 8 whereby it is noted that as the species diversity is becoming higher, the similarity index (Sites 1 & 2; Sites 1 & 3; Sites 2 & 3) is becoming lower. That showed an inverse relationship between each other. This also confirms that as the similarity is becoming higher, the level of dissimilarity (diversity) becomes lower.

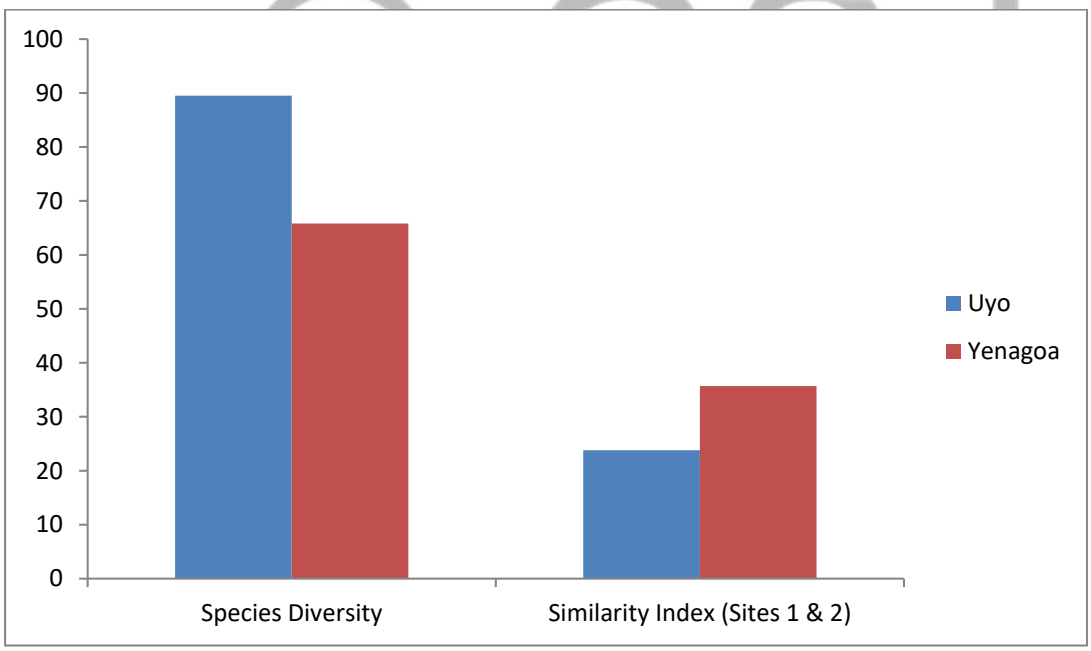

Figure 3: Species Diversity and Similarity Index (Sites 1 & 2) in Uyo and Yenagoa

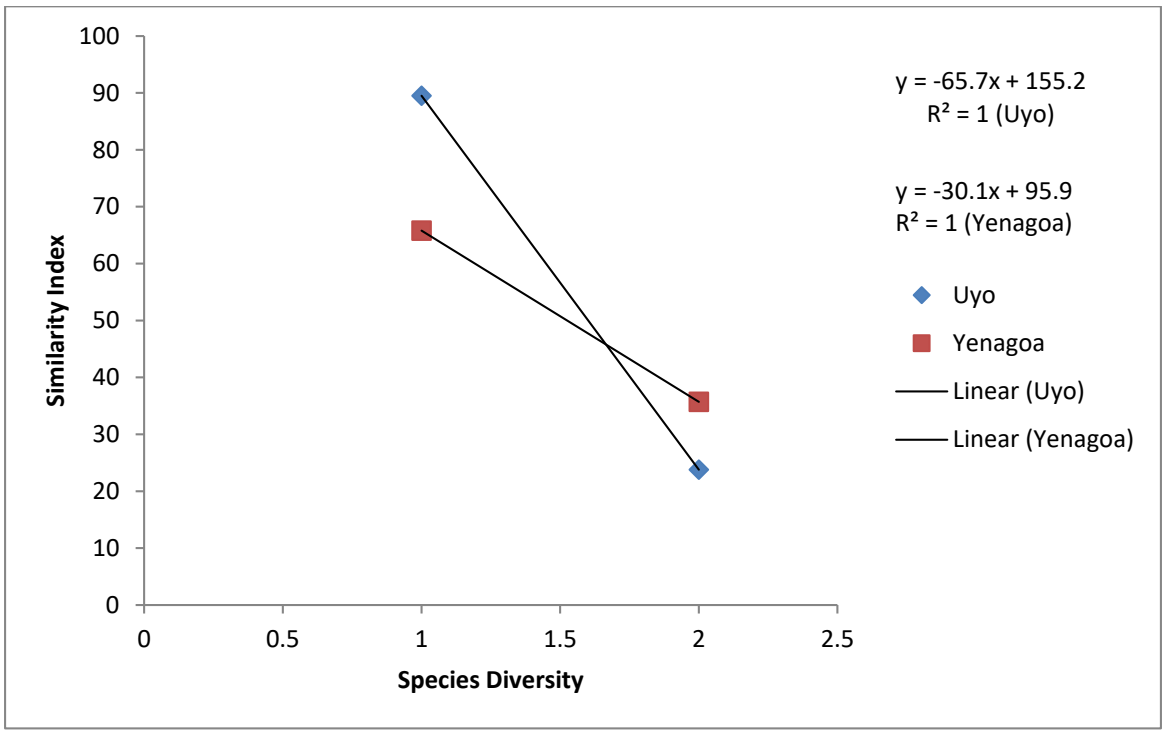

Figure 4: Scatter Diagram between Species Diversity and Similarity Index (Sites 1 and 2) in Uyo and Yenagoa

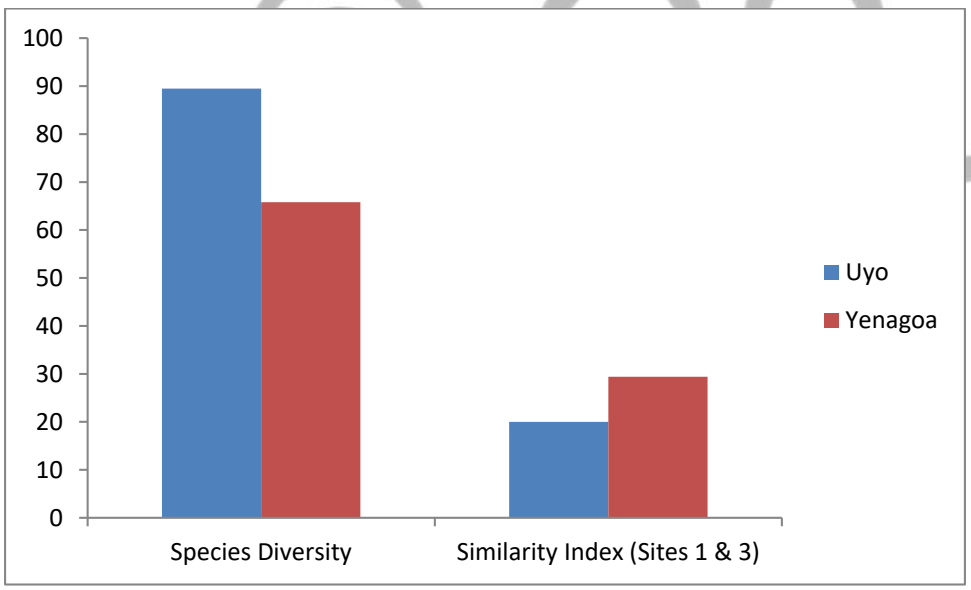

Figure 5: Species Diversity and Similarity Index (Sites 1 & 3) in Uyo and Yenagoa

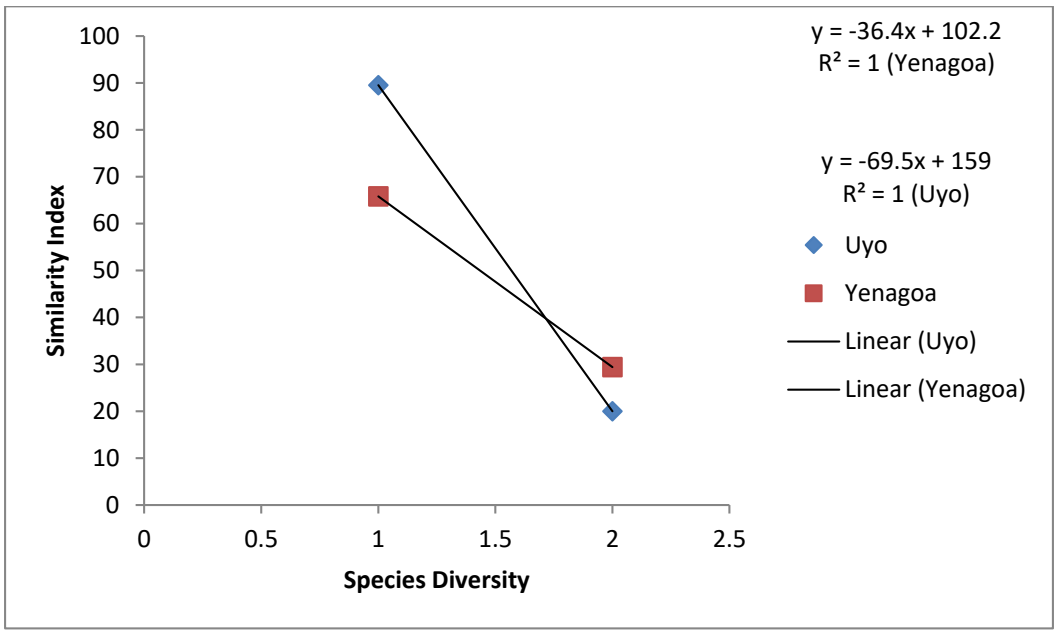

Figure 6: Scatter Diagram between Species Diversity and Similarity Index (Sites 1 and 2) in Uyo and Yenagoa

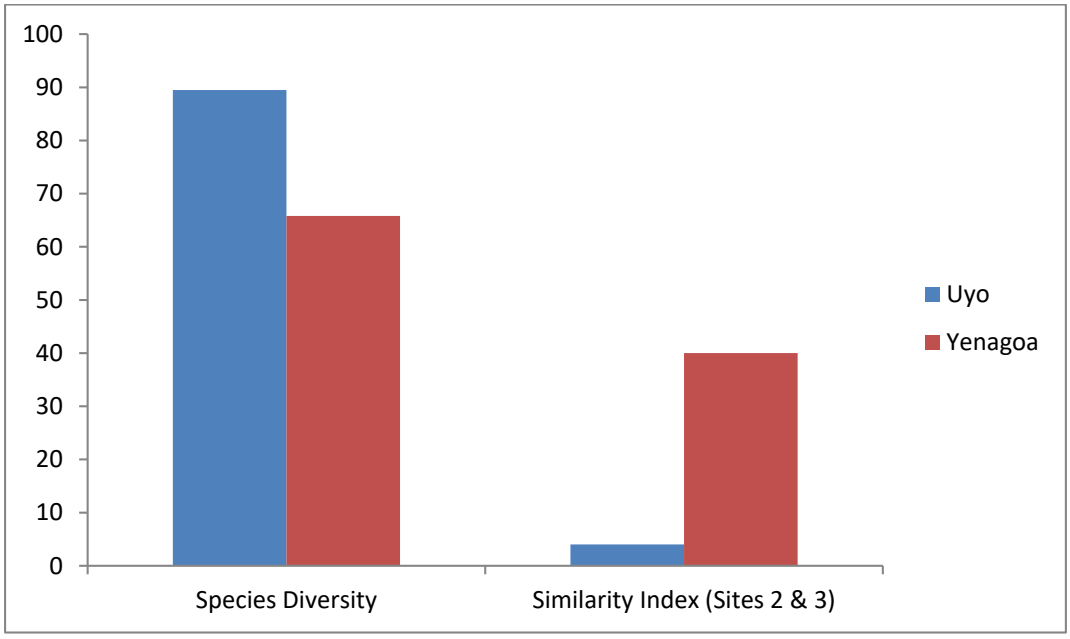

Figure 7: Species Diversity and Similarity Index (Sites 2 & 3) in Uyo and Yenagoa

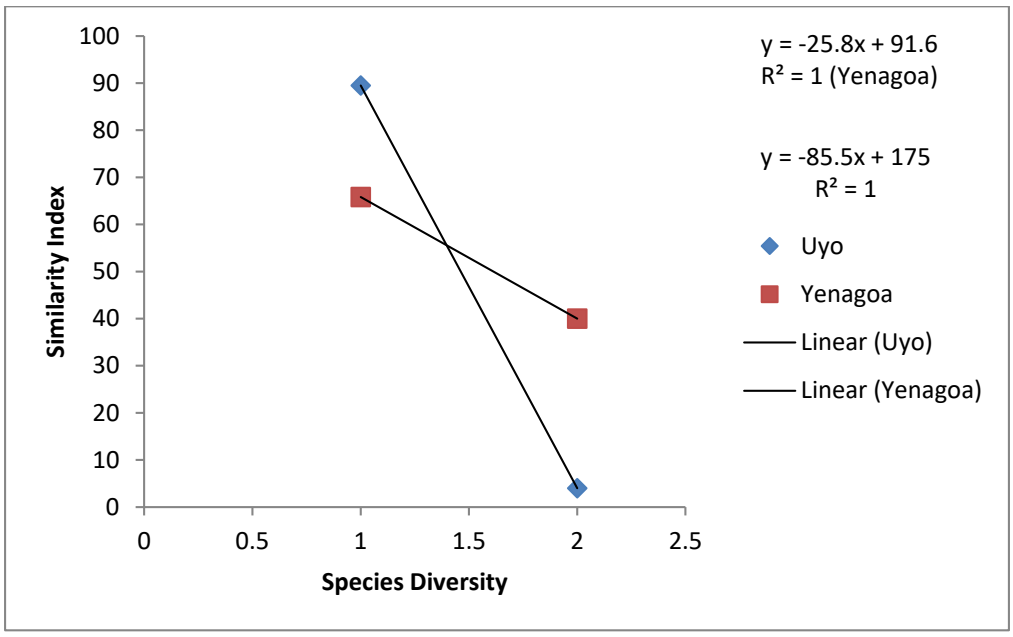

Figure 8: Scatter Diagram between Species Diversity and Similarity Index (Sites 2 and 3) in Uyo and Yenagoa

Discussions of Findings

The species diversity was higher in Uyo than that of Yenagoa. This may be attributed to the level of human activities informed by the level of urbanization and the size of the study location being dealt with. The study conducted by Mellinger et al., (2018) on diverse effect of degree of urbanization on species diversity revealed that even distribution of plant species type reduced with level of urbanization. Findings of Alexis (2013) also corroborates with these findings that the introduction of non-native plants have been on the increase in urban centers and has continued to affect plants biodiversity. Furthermore, with reference to type of identified plants more of native plants were observed in the control sites. This may have favoured species compositions because of low habitat fragmentation as urban centers are known for their high socio-economic that most timed do not consider ecosystem formations.

The similarity index among the sample locations in Yenagoa was higher than that of Uyo. Thus, this makes the level of species diversity in Uyo to be higher than that of Yenagoa which has a hidden foundation in the species composition.

The identified plant species under the sampled sites are composed of both native and non-native (exotic) plant species with more of exotic and ornamental plant species. The control study sites featured some plants identified under the sampled sites but low similarity index were obtained between them especially when plants identified under sampled sites were compared with plants

identified under control sites. The similarity index obtained in the present study was similar to that of Ariyo (2020).

Conclusion and Recommendations

The study is concluded that the species diversity in Uyo is higher than that of Yenagoa while the similarity index is lower in Uyo than that of Yenagoa. Thus, it can be concluded that as the species diversity is higher, the similarity index is lower. It is thus recommended that the protection of palnts especially in the urban settings should be highly established to reduce the level of similarity in the plant species and increase the level of species diversity.

References

Ariyo C.O. (2020): Comparative Analyses of Diversity and Similarity Indices of West Bank Forest and Block A Forest of the International Institute of Tropical Agriculture (IITA) Ibadan, Oyo State, Nigeria. Hindawi International Journal of Forestry Research Volume 2020, Article ID 4865845, 8 pages https://doi.org/10.1155/2020/4865845

Convention on Biological Diversity, 1992, http://sedac.ciesin.org/entri/texts/biodiversity.

Ecological Economics 68:925–928

Jost, L., (2009). Mismeasuring biological diversity: Response to Hoffmann and Hoffmann (2008).

Kashian, D. M. Barnes, , B. V. and Walker, W. S. (2003): Ecological species groups of landform level ecosystems dominated by jack pine in northern Lower Michigan, USA, Plant Ecology, vol. 166, no. 1, pp. 75–91

Leinster T, and Cobbold C.A. (2012): Measuring diversity: the importance of species similarity. Ecology. Mar;93(3):477-89. doi: 10.1890/10-2402.1. PMID: 22624203.

Magurran, A. E. (1998): Ecological Diversity and Its Measurement, Princeton University Press, Princeton, NJ, USA,

Mishra, B. P. , Tripathi, O. P. Tripathi, R. S. and Pandey, H. N. (2004): "Effects of anthropogenic disturbance on plant diversity and community structure of a sacred grove in Meghalaya, northeast India," Biodiversity and Conservation, vol. 13, no. 2, pp. 421–436,

OECD, (2002). Handbook of Biodiversity Valuation: A Guide for Policy Makers. Organisation for Economic Co-operation and Development, Paris.

Rao, C. R., (1982a). Diversity and dissimilarity coefficients: A unified approach. Theoretical Population Biology 21:24–43.

Rao, C. R., (1982b). Diversity: Its measurement, decomposition, apportionment and analysis. Sankhy¯a: The Indian Journal of Statistics 44:1–22

Simpson, E. H., (1949). Measurement of diversity. Nature 163:688.

Swindel, B. F. , Conde, L. F. and Smith J.E. (1984): Species diversity:concept, measurement, and response to clear cutting and site-preparation," Forest Ecology and Management, vol. 8, no. 1, pp. 11–22