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A survey of butterfly species at the University of Uyo Main Campus, Nigeria

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Abstract

The research aimed to survey the different types of butterflies present in the main campus of the University of Uyo. The specific objectives were to determine the diversity of butterfly species in the study area, assess the abundance of butterfly species, and examine their distribution. The study area was divided into three sections, and a known length permanent transect line of 10m width was established in each section (500m, 500m, and 300m). Over a period of two months, adult butterflies were collected and their features and classification were observed and recorded weekly. Statistical and ecological models, such as total population density, frequency relative abundance, and Simpson's diversity, were used to analyze the data collected. The results showed a total of 1222 butterflies were collected, with an average frequency of 20.33 per week. The density per hectare was 15.63, and the total population density was 22.56. The overall diversity of butterfly species was found to be 0.1643, with mean totals of butterflies in the three sections ranging from 6.67 to 8.17. The species richness values were 0.99, 0.83, and 0.86 in the first, second, and third sections respectively. The study concluded that the diversity of butterfly species in the study area was low, with only 8 identified species. It was recommended that efforts should be made to improve the vegetation, including planting more flowering plants and fruit trees, to enhance the butterfly diversity. Overall, the study emphasized the need for conservation measures to protect the butterfly species in the University of Uyo main campus.

Keywords: Abundance, Butterflies' survey, Distribution, Nigeria, Species diversity

Introduction

Insect comprises more than half of earth diversity of species (Kocher & Williams, 2002). Butterflies are insects in the macro lepidopteran clade Rhopalocera from the order Lepidoptera, which also includes moths. They belong to the phylum Arthopoda. (Gullan & Cranston, 2014). Adult butterflies have large, often brightly colored wings, and conspicuous, fluttering flight (De Jong, 2016). The group comprises the large superfamily Papilionoidea (Boonvanno et al., 2000).

According to (Mayer & Smith, 2008) butterflies are certainly one of the most appealing creatures in nature. Butterflies are a taxonomically well studied group, which have received a reasonable amount of attention throughout the world, yet even within genera containing very common and wide spread species, our understanding of true species diversity may prove to be startling below common expectation (Brunetti et al., 2001). They have been studied systematically since the early 18th century and about 20,000 species are documented worldwide by 1998. This figure is not constant because of continuous addition of new butterflies' species. Many butterflies' species are strictly seasonal indicators in term of anthropogenic disturbance and habitat quality (Feltwell, 2012). According to (Kocher & Williams, 2000), Lepidoptera community assembly and the factors which influence it have long been a topic of interest to ecologist and conservationists. Human dominated landscape form a substantial and ever increasing amount of the earth's surface. These modified habitats often influence butterfly species and their dynamics (O'Farrel & Anderson, 2010).

The aesthetic beauty and charismatic nature of many butterflies have the ability to invoke people's passion and interest, both of which are useful in butterfly conservation. Public interest in butterflies has grown enormously and has even become a political force in some countries (Molleman et al., 2005). Major building developments have been rejected and proposed motorways have been relocated simply to protect scarce butterfly populations (New et al., 1995). By using butterflies as targets in biodiversity conservation, many coexisting and codependent organisms, like their food plants and natural enemies, may also be conserved.

Butterflies, by virtue of their high sensitivity, respond strongly to habitat disturbance (Brown, 1997) and most have special geographical distributions (Larsen, 1994; 2006), reflecting past conditions, making them potentially useful biological indicator species. The use of butterflies as tools in rapid biodiversity assessment missions presents other advantages as well, such as their relatively stable and well known taxonomy, high sensitivity to changes in their habitats and microclimate

heterogeneity and a high correlation with spatial, structural, and taxonomic diversity of vascular plants (Panzer & Schwartz, 1998).

Arthropods are good indicators of habitats biodiversity because they respond quickly to environmental changes, and are highly diverse taxon (Prun, 2006). Lepidoptera (butterflies and moths) are the second largest order of arthropods and are most easily identified, making them particularly useful for biodiversity survey (Rickers et al., 2001). Butterflies occur in a wide range of situations but are particularly characteristics of humid tropical forests, in which the known species occur (Boonvanno, 2001). Two important aspect of diversity are species richness and relative abundance of individuals. Thus, species richness is a critical variable in conservation planning and natural resource management (Adedeji, 2011).

A large proportion of the earth's planets plant species including many trees depends on insects to pollinate their flowers. In turn, humans and other land-dwelling animals depend on plants (Inuoye, 2001). Disappearance of insects could lead to extinction of earth's animals because of the disappearance of so much plant life. Fortunately, insect has been around for at least 400 million years, and are phenomenally successful form of life (Warren, 2020). Today they are by far the planets most diverse, abundant and successful insect. The roles that the insects play in nature require us to understand how insects and other organisms living in a biological community interact with living and non-living environment. Biodiversity is the main form of the health and importance of natural ecosystem (Ma, 1993; Naeem et al., 1994; Tilman et al., 1996). In recent years, the problem of regional biodiversity loss has become more and more serious, and its conservation has become a global problem for mankind (Abell et al., 2008; Nelson et al., 2009; Rands et al., 2010). Conservation of biodiversity has become one of the main objectives of nature reserve (NR) construction (Butchart et al., 2010; Ma et al., 2012). So far, a large number of NRs have been set up all over the world to curb the loss of regional wild plant and animal and their habitats (Jenkins & Joppa, 2009). Researchers have proposed a lot of indexes to evaluate the species diversity with quadrat data, which reflect the conservation value to ascertain extent and includes the Simpson index and Shannon-Wiener index (McIntosh, 1967; Whittaker, 1972), etc.

Many wildlife organisms are at risk of extinction (Caldas et al., 2003). The major goal of conservation is to maintain biodiversity and distribution of organisms in particular ecosystem. According to Nelson (2009), biodiversity conservation is all about protecting all organisms and

species within their natural habitats with the aim of ensuring intergenerational and intergenerational equity. Activities such as habitat fragmentation, human disturbance, and habitat loss have to be adequately curtailed to enrich biodiversity conservation measures. Butterflies play important role in pollination. Declining butterfly population and the loss of diversity of natural resources and wildlife is a major problem of wildlife conservation (Heikkilä & Mutanen, 2012).

Therefore, there is need to know the abundance, distribution and diversity of these butterflies it will aid in their effective conservation. In University of Uyo, Nigeria, there has been no established study on the diversity, abundance and distribution of butterflies in the permanent site of the University of Uyo, Akwa Ibom State. This calls for an important need to survey and ascertain the diversity of butterflies which will help in the management and protection of the species of butterflies.

Material and methods

The study area

The study was carried out in at the permanent site of the University of Uyo, Akwa Ibom State. The permanent site of the University is located at Nwaniba Road after Ekpri Nsukara primary school. It is in Uyo local Government (Fig 1). Uyo is the capital of Akwa Ibom State. Akwa Ibom State is situated between latitudes 4.33^{1} and $5^{o}35^{1}$N and longitudes $7^{o}35^{1}$ and $8^{o}25^{1}$E and is located within the tropical rainforest zone with a landmass of 7,246,935sq.km (NPC, 2007). People residing in Uyo engage in several occupations which range from the civil and public services, industrial and commercial business to farming in parts of the urban areas.

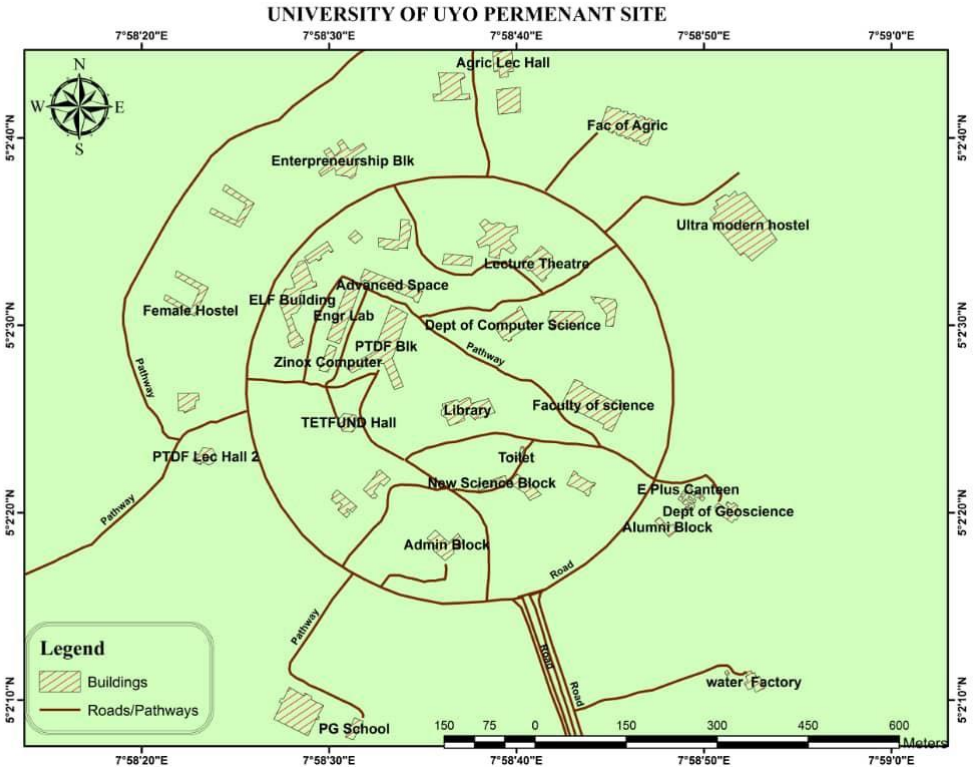

Figure 1. Map of the University of Uyo Permanent Site

Source: Department of Geography, University of Uyo, Uyo, Akwa Ibom State, Nigeria

The relief of Uyo Urban is that of a relatively gentle slope. Rainfall ranges from 800mm-3200mm per annum (Akpabio, 2004). Uyo has a relatively high mean annual rainfall of more than 2500mm and a mean annual temperature of 27^{o}C. It comprises twenty-one villages and a total area of 15750 hectares (Akpabio & Chukuiker, 2004). Rainfall begins in March and continues till October, with the peak in June and September. The dry season starts in November and lasts till February (Akpabio, 2004).

Materials used in the study

These include aerial nets, also called butterfly nets, this is the tool most associated with insect collecting, especially for collecting butterflies. These nets are generally made of lightweight materials that include an aluminium handle and a hoop constructed of stiff steel or steel straps. Others were; a field notebook, a Digital Camera, A measuring tape, Paper tape, a transparent container, a Global Positioning System Direction Application and a Safety jacket/shoes.

Sampling techniques

The study area was divided into 3 sections starting from the University's main gate. The first section of the campus embodies the University of Uyo Water Factory, Faculty of Agriculture, Staff Offices and Lecture Halls and Niger Delta Development Commission (NDDC) Students' Hostel. The second section was the left side from the small tree plantation through the engineering workshop to the female hostel. The third section is the middle section which comprises the science block, University of Uyo Administration Block, Computer Science Block, Engineering Block and the general library.

Data collection

Three permanent transect – lines (500m, 500m and 300m) in length and 10m in width were set up at each of the 3 sections. The Pollard's transect walk technique was conducted for diurnal adult butterflies during Lepidoptera activity, avoiding rainy and heavily overcast conditions. The pace was; slow but constant, covering the transect line in about an hour. Butterflies were collected at the peak of butterfly activities between 0900hrs – 1600hrs. Physical observation of the features and classification of the butterflies found in the area was done. This helps in diversity study. The population of butterflies found in the area was also counted. Features such as size and color were used in the classification for the diversity index. This was used to examine the distribution of butterfly species in the study area. All butterflies encountered during this study were collected using the sweep net and transported to the laboratory for setting and mounting. Photographs of the upper side and underside of the wings were taken to aid identification. Butterfly species were identified using the field guide to the butterflies of Western Africa (Larsen, 2005a, b) and Butterflies of Nigeria (Brattström, 2020b, 2020c, 2020d, 2021a, and 2021b).

Data Analysis

Data collected from this research was analyzed using statistical and ecological models like;

(1) Total population (P_t): = D × A

Where P_t = Total population of species

D = Population density (No. Per ha)

A = Total Area of the habitat (ha).

(2) Frequency:

% frequency = No. of sampling plot in which the species occur/ Total No. of sampling plots enumerated ×100.

(3) Relative abundance (RD).

$$RD = \frac{n_i}{N} \times 100$$

Where RD = Relative density

ni = number of individual of ith species

N = Total number of individual of all the species.

(4) Ecological statistics such as Simpson's diversity (SI) index was used to determine the diversity index of butterfly species in the study area:

$$SI = 1 - \frac{\sum n(n_i - 1)}{N(N-1)} \qquad \text{Equation 1}$$

Where SI = Simpson's diversity index

1 = Constant term

∑= summation sign

n = number of individual tree species in the study area.

N = Total number of individual of all the species.

(5) Species richness is a measure of the number of species found in a sample. This particular measure of species richness is known as D, the Menhinick's index (Abebe, 2005). Thus; Species richness was analyzed using the formula below;

$$R = \frac{S}{\sqrt{N}} \qquad \text{Equation 2}$$

Where

R = Menhinic's (1964) plant species index

S = Number of species

N = Total number of individuals in the plot.

(6) Diversity: Species diversity will be calculated using the Simpson's index of Diversity (1949) as follows;

Where:

$D = \sum [\frac{n(n-1)}{N(N-1)!}]$ Equation 3

D = Simpson's index of Diversity

N = Total number of individuals encountered

N1 = Number of individuals of each species encountered.

(c) Evenness: The measure of Evenness *(E)* being the ratio of observed diversity to maximum diversity and it was calculated using the formula by (Rico-Gray *et al* 1990).

$E = H/Hmax, = H^I/InS$ Equation 4

Where,

Hmax = maximum dispersion (taking into account the number of species present in the plot), and Hmax = 3.3219 log 10 S.

S = Total number of species (Pandey, et al, 2006). Species evenness has values between 0 and 1.0, where 1.0 represents a situation in which all species are equally abundant.

The values obtained from the above calculations will be analyzed statistically to test for significance of differences.

Results

Composition and classification of butterflies in the study area

A total number of 122 butterflies comprising 8 species belonging to 3 families in the order Lepidoptera were encountered in the study area. This indicates that the study area had a considerable diversity and abundant number of butterfly species. Table 1 below indicates that *Catopsilia florella* showed the highest density of 5 x 10^{-4} individual/ha, a mean frequency of 5.0 and a total population of 167,790.7 butterflies; followed by *Junonia oenone oenone* with a density of 4.17 x 10^{-4} individual/ha, the mean frequency of 4.17 and a total population of 139,937.44 butterflies per hectare, *Appias epaphia* had a density of 3.333 x 10^{-4} individual hectare, the mean frequency of 3.33 and a total population of 11, 784.60 butterflies, *Junonia terea terea* had the density of 2.8 x 10^{-4} and a total population of 94,969.53, *Junonia sophia sophia* with the density of 2.5 x 10-4 individuals per hectare, mean of frequency of 2.5 and a total population of 83,895.35 butterflies, *Danaus*

chrysippus alcippus had the density of 1.67 x 10^{-4} individuals per hectare, mean frequency of 1.67 and a total population of 56,0442.09 butterflies. *Papilo dardanus* had a density of 5.0 x 10^{-5} individual hectares, mean frequency of 0.50 and a total population of 16,779.06 butterflies. *Melanitis leda* shown the least density of 3.3 x 10-5 individual/hectare, mean frequency of 0.33 and a population of 11,074.18 butterflies.

From the result, number of butterflies that were observed and caught in the study area was low. This may have been because of the season or as a result of other environmental factors like the type of vegetation, availability of food (flowers), temperature, numbers of predators etc. Abideen et al., (2015) recorded that a higher number of 698 individuals belonging to six (6) families of butterflies in the University of Ibadan were observed. The vegetation covered in the University of Uyo is more of grass than flowering crops. This could also influence the abundance and distribution of the butterfly species as there is not enough flowering plants and fruit trees to attract butterflies (Abideen et al., 2015). The mostly grassy vegetation and the relatively higher temperature experience in the study area may have affected the number of butterflies. This agrees with Breinholt (2014) who reported that butterflies responds rapidly to minor changes in untamed life, thereby making them a great pointer of diversity (Landau et al., 1999).

Nevertheless, *C. florella* had the highest frequency, density and total population. This may be due to the fact that it is a migratory insect and may not be highly affected by the vegetation and environmental condition in the study area since it moves from one environments to another following rain patterns (Breinholt, 2014; Brattström, 2020b). Furthermore, the results of the current study are in line with previous research that has reported on the density and abundance of specific butterfly species. For example, the high density and population size of *C. florella*, *J. oenone oenone*, and *A. epaphia* found in this study are consistent with findings from other studies that have identified these species as being abundant and widespread in tropical and subtropical regions (Hamer *et al*., 2013; Vila *et al*., 2014). Similarly, the lower density and population size of Melanitis leda reported in this study are in line with previous research that has identified this species as being less abundant compared to other butterfly species (Kunte et al., 2016).

It's worth noting that the results of this study may vary depending on the specific location and environmental conditions of the study area, as well as the sampling methods used. However, overall, the findings of this study are consistent with previous research on butterfly diversity and abundance

in tropical and subtropical regions and provide valuable insights into the composition and population characteristics of butterfly species in the study area.

Table 1. Composition of Butterflies

S/n	Common name	Scientific name	Sighted Frequency	Mean frequency	Standard Deviation (STDEV)	Density/ha	Total Population
1.	Soldier pansy	*Junonia terea terea*	17	2.83	10.02	2.18	3141.3
2.	Little Pansy	*Junonia sophia sophia*	15	2.50	8.84	1.92	2775
3.	Dark blue Pansy	*Junonia oenone oenone*	25	4.17	14.73	3.21	4.628.7
4.	African plain tiger	*Danaus chrysippus alcippus*	10	1.67	5.89	1.28	1853.7
5.	Mocker swallowtail	*Papilio dardanus*	3	0.50	1.77	0.38	555
6.	Epaphia	*Appias epaphia*	20	3.33	11.79	2.56	3696.3
7.	African Migrant	*Catopsilia florella*	30	5.00	17.68	3.85	5,550
8.	Common evening brown	*Melanitis leda*	2	0.33	1.18	0.25	366.3
	Total	**-**	**N = 122**	**20.33**	**71.89**	**15.63**	**22.56**

Source: Field Survey, 2023.

Diversity of butterfly

The result in Table 2 shows that the diversity indices of the butterflies encountered in the study area ranged from 0.0001 – 0.0589. *C. florella* had the highest species diversity of 0.0589, followed by *J. oenone oenone* with 0.0406 while *M. leda* had the lowest species diversity score of 0.0001. In total, the butterflies species in the study area had a total diversity score of 0.1643. This result implies that the diversity of butterflies in the study area is very low. The lower diversity and at large a reduced population of this insect will hurt the environment. This is because butterflies serve as indicators of a healthy ecosystem and are very sensitive to habitat degradation and pollution and are also a very important group as they are the natural pollinators of plants (Moya et al., 2014).

Table 2. Diversity of Butterfly Species

S/N	Scientific Name	Total number (n)	n-1	n(n-1)	N	N-1	N(N-1)	$\frac{n(n-1)}{N(N-1)}$
1.	*Junonia terea terea*	17	16	272	122	121	14762	0.0184
2.	*Junonia sophia Sophia*	15	14	210	122	121	14762	0.0142
3.	*Junonia oenone oenone*	25	24	600	122	121	14762	0.0406
4.	*Danaus chrysippus*	10	9	90	122	121	14762	0.0060
5.	*Papilio dardanus*	3	2	6	122	121	14762	0.0004
6.	*Appiass epaphia*	20	19	380	122	121	14762	0.0257
7.	*Catopsilia florella*	30	29	870	122	121	14762	0.0589
8.	*Melanitis leda*	2	1	2	122	121	14762	0.0001
	Total	**N =122**	**114**	**2430**	**976**	**968**	**118,096**	**0.1643**

Source: Field Survey, 2023.

Relative abundance of butterfly

The result of the abundance of butterfly species is presented in table 3 above. The table indicated that the species *C. florella* had a higher relative abundance index than any other butterfly species encountered in the study area. The relative abundance of *C. florella* was 24.59%, followed by *J. oenone oenone* with relative abundance of 20.49%. *A. epaphia* had a relative abundance value of 16.39%, *J. terea terea* had a relative abundance of 13.93, while *J. sophia sophia* had a relative abundance value of 12.30%. Also, *D. chrysippus* had a relative abundance value of 8.20, *P. dardanus dardanus* had a relative abundance value of 2.46%, and *M. leda* had the least relative abundance value of 1.64%.

The result indicated that the relative abundance of *C. florella* is higher in the main campus of the University of Uyo, and the butterfly species with the least relative abundance was *M. leda.* The possible reason for low abundance in *M. leda* is the study could be attributed to the presence of few fruiting trees and dense undergrowth vegetation in the study area as the species prefers to camouflage in shaded undergrowth while feeding on fallen and rotten fruits (Brattström, 2020a). This is also in accordance with Kehimkar (2013) who stated that adults *M. leda* fly rapidly at low level and puddles on wet grounds.

Table 3. Relative Abundance of Butterfly Species

S/N	Scientific Name	Family	Frequency (n)	Mean Sighted Frequency	Relative Abundance %
1.	*Junonia terea terea*	Nymphalidae	17	2.83	13.93
2	*Junonia sophia sophia*	Nymphalidae	15	2.50	12.30
3	*Junonia oenone oenone*	Nymphalidae	25	4.17	20.49
4	*Danaus chrysippus*	Nymphalidae	10	1.67	8.20
5	*Papilio dardanus*	Papilionidae	3	0.50	2.46
6	*Appiass epaphia*	Pieridae	20	3.33	16.39
7	*Catopsilia florella*	Pieridae	30	5.00	24.59
8	*Melanitis leda*	Nymphalidae	2	0.33	1.64
	Total		**122**	**20.33**	

Source: Field Survey, 2023.

Distribution of butterfly species in the study area

The results of species distribution according to study partitions are presented in Table 4 below. The results indicate that in section 1 *A. epaphia* had the highest percentage abundance of 27.0%, followed by *J. terea terea* 21.7%, *J. sophia sophia* 13.6% followed by *J. oenone oenone* 18.10% followed by *C. florella* 13.6% followed by and *P. dardanus dardanus* had the lowest percentage abundance of 55%. In section 2, *C. florella* had the highest percentage abundance of 38.89%, followed by *J. oenone oenone* 22.2% and *D. chrysippus* with 11.12%, while *P. dadanus* had the lowest percentage abundance of 2.8%. In section 3, *C. florella* also had the highest percentage abundance of 22.4%, followed by *A. epaphia* 20.4% and *J. sophia sophia* and *D. chrysippus alcippus*, with 20.40% respectively, while the *M. leda* had the lowest percentage abundance of 4.0%. From the results above, *D. chrysippus alcippus* and *M. leda* were not seen in the first section. The variations in the occurrence of species across the different sections of the study area could be attributed to differences in environmental conditions such as food availability, the presence of predators or vegetation. In the second section, *J. sophia*, *A. epaphia* and M. leda were not observed, while in the third section, *J. terea* and *P. dardanus* were not observed. This observation is by the report of Anue et al., (2009) who observed that the abundance of the butterfly was influenced by environmental factors like temperature, photoperiod, rainfall, humidity, availability of food resources and vegetation type. Therefore, one or some of the stated factors above may have been one reason for the absence of some species in some sections. Accordingly, Anderson (2003) reported that a large number of butterflies obtain their nutrients from flower nectar and pollen.

Nevertheless, there is a group of butterflies that never visit flowers. These are thick-bodied butterflies that seem to require richer foods to supply their powerful flight muscles such as members of the *Genera euthalia* (Bhuyan et al., 2014).

Table 4. Distribution of Butterfly Species in Study Area

S/N	Species	Section 1		Section 2		Section 3		Total
		f	%	f	%	f	%	
1	Soldier Pansy	8	21.7	9	25	-	-	17
2.	Little Pansy	5	13.6	-	-	10	20.40	15
3.	Dark blue Pansy	7	18.10	8	22.2	10	20.40	25
4.	African plain tiger	-	-	4	11.12	6	12.20	10
5.	Mocker shallow Tail	2	55.5	1	2.8	-	-	3
6.	Epaphia	10	27.0	-	-	10	20.40	20
7.	African Migrant	5	13.6	14	38.89	11	22.40	30
8.	Common Evening Brown	-	-	-	-	2	4.00	2
Total		**37**		**36**		**49**		**122**
Mean Total		**6.67**		**7.2**		**8.17**		

Source: Field Survey, 2023.

Biodiversity indices of butterfly species

The biodiversity indices of butterflies in the study area were assessed using three parameters: diversity, number of individuals, and species richness. The diversity index in Section 1 was calculated to be 0.17, in Section 2 it was 0.26, and in Section 3 it was 0.18, with a total diversity index of 0.16. The number of individuals counted in Section 1 was 37, in Section 2 it was 36, and in Section 3 it was 49, with a total count of 122 individuals. The species richness index in Section 1 was 0.99, in Section 2 it was 0.83, and in Section 3 it was 0.86, with a total species richness index of 0.724.

These findings indicate that the study area has moderate biodiversity, with higher diversity and species richness observed in Sections 1 and 3 compared to Section 2. The diversity index provides a measure of the variety of species present in an area, with higher values indicating higher diversity. The number of individuals counted provides information on the population size of butterflies in the study area, with Section 3 having the highest number of individuals. The species richness index reflects the number of different species present in an area, with higher values indicating higher species richness.

These results are consistent with previous studies on butterfly biodiversity in Nigerian university campuses. For example, a study conducted by Adeniyi et al., (2017) in a Nigerian university campus reported similar findings, with moderate diversity and species richness of butterflies in the study area. Another study by Aremu et al., (2015) conducted in a different Nigerian university campus also reported comparable diversity and species richness indices for butterflies. Although the diversity was low in all the sections, section two had the higher diversity. This is due to the presence of abundant flowering, plants around the hostel and the engineering block. These flowers attract a lot of insects. This result agrees with the findings of Yager et al., (2017), who reported a low diversity of 5 families of butterflies in the Federal University of Agriculture, Makurdi Forestry Nursery. However, the result disagrees with Efenakpo et al., (2018) who recorded high diversity across the residential/gardens, farmland and secondary forestry of the University of Port Harcourt, Rivers State.

Table 5. The Biodiversity Indices of Butterflies in the Study Area

Parameter	Section 1	Section 2	Section3	Total
Diversity	0.17	0.26	0.18	0.16
Number of individuals	37	36	49	122
Species Richness	0.99	0.83	0.86	0.724

Source: Field Survey, 2023.

Conclusion

The diversity of butterflies on the permanent campus of the University of Uyo was very low compared to what is obtainable in other university campuses. A total of eight (8) species of butterfly species were identified in the study area is very low. *C. florella* were the most frequently observed butterfly species and this may be as a result of their habitat requirement and adaptation to the modified human environment and fragmented habitat. Species diversity and evenness indices were least in sections 2 and 3 and highest in section 3. It showed that the number of species of butterflies observed in section 1 was higher than in sections 2 and 3.

Recommendations

Based on the findings of this research as this research forms a baseline for butterfly taxonomy and distribution in the Permanent Campus of the University of Uyo and for further study and research, it is important to recommend the following:

- The use of insecticides and pesticides should be controlled as it has a very big effect on the existence of butterflies.
- Flowering plants should be cultivated around the campus to attract more butterflies.
- Afforestation should be carried out at various sections of the campus
- Periodic monitoring of the abundance and diversity of butterflies should be carried out in the study area using a combination of fruit-baited traps and sweep netting to account for more butterfly fauna.
- Fruit trees should be cultivated to attract fruit-feeding butterflies.

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