ABUNDANCE AND COMPOSITION OF AQUATIC INSECTSOF OWENA RIVER, ONDO STATE, SOUTHWESTERN NIGERIA.

By

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Abstract

Investigation on aquatic insect's composition of Owena River in Ondo state was carried out from march to April,2021.Aquatic insects were collected from two sampling stations used in the study. A total of 187 aquatic insects individuals were collected consisting of five (5) orders and 15 families.The order Coleoptera was the most abundant order with a high number of individuals recorded in the two station while least individuals were recorded from the order Odonata. Hemiptera is the dominant order in which 6 different genera were collected during this study. Absence of Ephemeroptera and Plecoptera in station 2 indicate pollution in the station and therefore there is need for proper management.

Keyword: Aquatic pollution, pollutant, aquatic insects, water quality

1.1.Introduction

Aquatic pollution is a worldwide problem affecting both developed and emerging nations (Mateo- Sagasta *et al*. 2017).It was noted that 80% of municipal wastewater globally are not treated and are release into various water bodies and also millions of tons of heavy metals, solvents and toxics chemicals are being discharge by industries into various water bodies every year bringing about pollution ((Mateo- Sagasta *et al.*2017;WWAP,2017).Universally,70% of water are used for agriculture,hence agriculture plays a significant role in polluting water environments because large amounts of agrochemicals such as fertilizers and pesticides are washed into water bodies from agricultural lands bringing about their contamination resulting in degrading their quality and making them poisonous and toxics for human consumptions (Mateo-Sagasta et al. 2017).Mateo- Sagasta *et al*. (2017) implies that most water bodies are capable of diluting pollution to certain extent,but if the contamination is above its threshold level it can result in the change of community structure of aquatic fauna and flora.

Aquatic insects constitute an integral part of aquatic ecosystem and have both economic and ecological importance. Their presence in the water bodies serve various purposes, such as source of food to fishes and other aquatic invertebrate ,Some aquatic insects like *Dytiscus* are predators

to other aquatic invertebrates and this help in maintaining the balance among different types of organisms in the freshwater ecosystem. Some aquatic insects take part in nutrient recycling, while others serve as vectors responsible for transmitting diseases pathogen to both humans and animals (Chae *et al*., 2000).Some aquatic insects are very sensitive to pollution such as Ephemeroptera,Plecoptera and Tricoptera, therefore their presence in the water body indicate a good water quality while others like dragonflies (Odonata) tolerate somewhat pollution, others are pollution tolerant species like *blackfly* larva and so their presence in the water body indicate very bad water quality (Hepp *et al*,2013).

Owena River is a very valuable source of livelihood to its inhabitants and neighboring community.And also one of the most important rivers in Ondo state. It serves as a source of drinking water and other domestic activities by its inhabitants. Unfortunately, the impact of human activities on this River such as outdoor bathing, washing clothes and dumping of refuse brings about a lot of contamination to the river.These contaminations have continued to pollute and reduce the quality of the river. Although there was no literature specifically on the Abundance and composition of aquatic insect of Owena river. The only few researches available are, Oke (1990) Limnology and macrobenthos of Owena Reservoir, Oke (1998)Plankton diversity, abundance and productivity in the Owena Reservoir, Southwest Nigeria,phytoplanktons of Owena river and reservoir by Olaniyan and Akinkuolie (2016), Olaniyan (2010), Physico-chemical parameters and Plankton of Owena River, Ondo state, Oyhakilome *et al* (2011) water quality assessment of the Owena Multi-purpose Dam, Ondo state, Southwestern Nigeria,Therefore there is need for this study.The aim of this study is to provide the checklists of various aquatic insects' orders of Owena River.

2.0. Methodology

2.1. Study Area

This study is conducted on Owena River located in idanre local government area of Ondo, southwestern Nigeria.The area lies on latitude 7º.00´ -7º.30´N and longitude 5º.00´-5º.30´E.The annual rainfall of the area is between $100\pm40cm$ and the temperature is 28^0cm (Oke, 1990).The distinct annual rainy season of the area occur from April/May to October, the heaviest rains fall between June to October; with occasional august break. Dry season is between November to February (Oke,1990).The vegetation of the area is mangrove vegetation characterize with tall trees that range between the heights of 20-40m.The commonly cultivated crops in Owena are yam, pawpaw, cassava, maize, Okro and vegetables while the major cash crops cultivated in Owena are palm oil and cocoa.The major occupation of the inhabitant of this area are palm oil processing,cocoa planting,trading,fishing and hunting.The river get contaminated from various anthropogenic activities carried out by the inhabiting which include bathing,washing of clothes,washing of agricultural tools, spraying of chemicals on tree crops and defecation.

2.2. Sampling stations

Two sampling station designated as 1 and 2 were selected for the purpose of this study.The sampling station selected comprises of upstream and downstream part of the river. Station 1 is located upstream of the river and is devoid of anthropogenic activities while station 2 receives effluents from the farm land around the area and also the river receives so many effluents through this station such as bathing from the residence, washing of agricultural tools, defecation among other.

2.3. Collections of samples and analysis

Aquatic insects were collected monthly between March and April, 2021 with the aid of sweep net and deep net.The nets were used to scoop the surface water, the substratum and the riparian vegetation around the river. The contents collected were poured in a white tray for sorting and screening of aquatic insects, aquatic insects are handpicked from the tray while non- aquatic insect are return to the river. The aquatic insects collected and sorted per station are preserved in a sampling bottles containing 70% ethanol and label accordingly. The identification of the aquatic insects to the possible taxonomic level mostly specie level is done at entomological laboratory Obafemi Awolowo University. The aquatic insects identification is done using standard identification keys and guide such as De Moor *et al*.,(2003) and Umar,Harding, & Winterbourn, (2013).

2.4. Data Analysis

PAST (Patheological statistical package; version 3.14) was used to determine Shannon –Weiner diversity index,Magerleaf index and evenness index.Descriptive statistics was used to calculate the percentage composition of aquatic insects in each sampling station.

3.0. Results

3.1. Aquatic Insects Composition

An overall total of 181 individuals (inds) distributed in 5 orders of aquatic insects represented by 15 taxa were collected at Owena river during the study.Abundance and percentage composition of the overall aquatic insects,from the two sampling stations are shown in Table 1.Station 1 recorded the highest number of individuals,151 at 80.7% as shown in Table 1 while station 2 recorded least number of individuals,36 (19.3%).As shown in table 1 Hemiptera is the dominant order as 6 different genera were collected during this study,While Coleoptera is the most abundant order as it accounted for 103 individuals in station 1 while 12 individual is recorded in station 2.Order coleoptera also account for 61.5% of the entire collection.However *Macromiidae* and *Chlorocyphidae* (order Odonata) were the least individuals collected in station 1 while*Macromiidae* (order Odonata) is the least collected in station 2.

3.2. Diversity Indices

Table 2 revealed the diversity indices of the two sampling station used in the study.Simpson index of 0.5018 was recorded for station 1 while station 2 recorded 0.642.Shannon value recorded for station 1 is 1.022 while the value obtain for station 2 was 1.061.the value obtain for Evenness in station 1 is 0.5559 while that of station 2 is 0.9629.Margalef index were 0.7972 and 0.5581 for station 1 and 2 respectively.All the diversity indices recorded are high in station 2 except for Margalef index.

4.0.Discussion

The abundance and composition of aquatic insect collected in this study shows that the river is fairly rich.The occurance of high number of individuals in station 1 can be attributed to suitable microhabitat and less anthropogenic activities around the station and this is in line with the findings of Amusan and Balogun (2018) on Aho stream, Osun state southwestern Nigeria. While the less number of individual species recorded for station 2 is attributed to the disturbances and certain human anthropogenic activities taking place around the station.The low number of

aquatic insects recorded in the station 2 can also be due to stony substratum observed in the station and this is in agreement with the findings of Ogbogu and Akinya (2010).EPT are indicators of good water quality because they are pollution sensitive species.Their presence in a water body is an indication of good water quality while their absence indicate bad water quality(Rife and Moody,2004)In this study Ephemeroptera and Plecoptera are recorded in station 1 this indicate that the station 1 is of good water quality.While the absence of Ephemeroptera and Plecoptera at station 2 is an indication of bad water.This shows that station 2 is polluted and this is in accordance with the findings of Esenwo,*et al* (2017) which shows that the absence of pollution sensitive taxa in Nwaniba River,Akwa Ibom southeast Nigeria is an indication of pollution.The presence of Odonata in both the station can be attributed to their diverse feeding pattern and availability of good aquatic vegetation.

Conclusion

In conclusion the presence of pollution sensitive species in station 1 is an indication that that the station is not polluted and is devoid from human anthropogenic activities,while absence of these species in station 2 indicate that the station is polluted and there is need for proper managements

Table 1:Taxonomic composition and abundance of Aquatic insect's fauna of Owena Rivers, March-April, 2021

Taxa	Station 1		Station 2	Total	Abundance(%)
Hemiptera					
Naucoridae	8	0	08	4.3	
Notonectidae	0	2	2	1.1	
Belostomatidae	9	10	19	10.2	
Hydrometridae	2	0	2	1.1	
Nepidae	4	2	6	3.2	
Hebridae	0	2	2	1.1	
Coleoptera					
Gyrinidae	103	12	115	61.5	
Ephemeroptera					
Heptageniidae	6	0	6	3.2	
Leptophlebiidae	2	0	2	1.1	
Oligoneuriidae	3	0	3	1.6	
Plecoptera					
Perlidae	6		0	6	1.6
Odonata					
Coenagrionidae	6	4	10	5.3	
Macromiidae	1	1	2	1.1	
Libellulidae	0	3	3	1.6	
Chlorocyphidae	1	0	1	0.53	

Total   151   36   187

% Composition 80.7% 19.3% 100%   100

Table 2: Species richness and diversity indices of aquatic insects' fauna of Owena Rivers, March – April, 2020

	Station 1		station 2
Taxa_S	5		3
Individuals	151		36
Dominance_D	0.4982	0.358	
Simpson_1-D	0.5018		0.642
Shannon_H	1.022		1.061
Evenness_e^H/S	0.5559	0.9629	
Margalef	0.7972		0.5581

Plate 1:Order Hemiptera   Plate II:Order Coleoptera
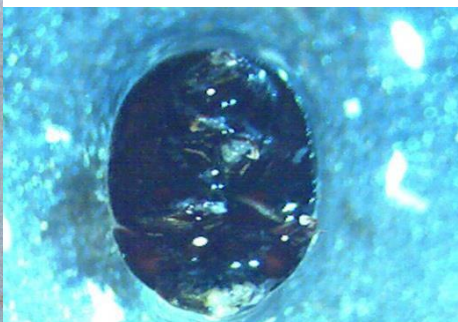

Plate III: Order Odonata   Plate IV: order Ephemeroptera

Figure 1: (Plate I-IV) Showing pictures of some aquatic insects collected from the sampling stations at Owena River

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