ASSESSMENT OF MACROBENTHIC INVERTEBRATES OF GUBI DAM, GANJUWA – BAUCHI STATE.

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ABSTRACT
Macroinvertebrates of Gubi dam, Ganjuwa Local Government Area, Bauchi state, Nigeria was studied with the aim of understanding their diversity and abundance. Macrobenthic samples were randomly collected in the month of January, 2018 at three different locations: Head water (Tatumari station), Middle water (Polo station station) and Tail water (Spill way station) using standard method. The samples collected were identified with the aid of microscope in a well illuminated laboratory and later referred to monograph for comfirmation. The individual abundance was expressed in percentages and biodiversity indices were determined. The results showed that 105 individual benthic invertebrates belonging to 7 orders and 8 families were identified. Hemiptera had two families while Neotaenioglossa, Diptera, Plecoptera, Coleoptera, Odanata, and Ephemeroptera had one family each. *Aquarius remigis* (43) and *Goniobasis livescens* (29) were the most abundant benthic invertebrates caught in Gubi dam while the least abundant species were *Ranatra elongata* (2.86), *Dytiscus marginalis* (2.86) and *Tanytarsus sylvaticus* (0.95). Spillway had more individuals benthic fauna (40) than Tatumari (33) and Polo (32). The benthic invertebrates were evenly distributed (E=0.75). It is recommended that physicochemical parameters of the dam be studied. Also similar research should be carried out in more water bodies in Nigeria.

Keyworsds: Macrobenthic, Abundance, Biodiversity indices, Physicochemical, *Aquarius remigis*

INTRODUCTION
Macrobenthic invertebrates can be found in aquatic environment from small pond to large lakes. Within a water body, aquatic invertebrates inhibit a variety of habitats. In lotic they occur under stones or woody debris, buried in sand or sediment and crawling or sprawling on rocks, leaf packs and snags (Bouchard, 2004). Benthic invertebrates in freshwater can be used as indicators of changes in water quality. They also form an important part of the aquatic ecosystem food chain especially for larger animals (Uwadiae, 2010). They play a vital role in the circulation and recirculation of nutrients in aquatic environment.

According to Mooraki *et al*. (2009) rivers act as an important ecosystem that maintains the coastal biota and thus, is high in productivity and serve as nursery and breeding ground for many organism that occupies it. Pond fertilization enhances algae growth and produce macroinvertebrate suitable for larval fish. Several studies in Nigeria have investigated benthic invertebrate communities especially in some specific rivers: Anambra River (Eyo and Ekwonye, 1995), (Ogbeibu and Egborge, 1995) and Ogba River (Olumukoro and Okologume, 2008).

Invertebrate communities change in response to changes in physicochemical factors and available habitat. Chatzinikolaun *et al*. (2016) stated that human induced hydrological changes and other physical disturbances like habitat alteration, urban land use, chemical contamination, surface run-off, intensive agriculture and so on are examples of processes responsible for a broad scale deterioration of lotic ecosystems. The abundance of benthic fauna greatly depends on physical and chemical properties of the substratum.

Elias *et al*. (2014) stated that in tropical African regions, researches on the status and trends of freshwater macroinvertebrates in rivers have not been given much attention compared to non-tropical regions. It became necessary and important to study benthic invertebrates abundance and diversity because of the role they played as bioindicators of specific environment and habitat conditions. Increased anthropogenic activities increases pollution and causes varying degree of damage to the benthic ecosystem. Danladi *et al*. (2013) stated that highlighting the abundance of invertebrates in lotic and lenthic water bodies is paramount as they provide useful information on natural and anthropogenic disturbance gradients.

There is very scanty information on the composition and abundance of macro invertebrate in Gubi dam. Therefore, the goal of this research is to identify the macroinvertebrates present in the dam and to determine their composition and abundance as well as the diversity indices of macrobenthic invertebrate in the dam.

MATERIALS AND METHODS

STUDY AREA

The study was carried out in Gubi dam, Ganjuwa Local Government, Bauchi State, Nigeria. Gubi dam lies within 9° 5' 30" E and 10° 24' 32" N. The embankment of the dam have a length of 3.86 km. The area has two distinct seasons; a short (June-September) wet season and a long (October-May) dry season.

SAMPLING PROCEDURE

Macrobenthic samples were randomly collected in the month of January, 2018 at three different locations: Head water (Tatumari), middle water (Polo) and tail water (Spill way) in the dam, according to the method described by Andem*et al*. (2012). The collected samples were sorted into different groups and preserved in 10% formalin solution.

IDENTIFICATION OF FISH SPECIES

The samples collected were identified with the aid of microscope in a well illuminated laboratory using a magnifying glass and later referred to a combination of monographs (Batchellar, 2017; Danladi*et al.,* 2013 and 10WATER, 2005) for confirmation**.**

DATA ANALYSIS

The individual abundance of macrobenthic invertebrate was expressed in percentage composition of each order.

STATISTICAL ANALYSIS

The macrobenthic data obtained were subjected to diversity indices to determine: Shannon index (H`), Evenness (E), Simpson`s dominance index (D) and Margalef`s diversity index (d) using the following diversity indices formulas (Ogbeibu, 2005)

Shannon index (H') = $\sum (\frac{n}{N})\text{In } (\frac{n}{N})$ . . . i

Where n = number of abundance of each species in the sample

N = total number of all species in the sample.

Evenness index (E) = $\frac{H'}{InS}$ . . . ii

Where S = number of distinct order in all the samples

Simpson's species dominance (D) = $\frac{S}{\sqrt{N}}$ . . . iii

Margalef's diversity index (d) = $\frac{S-1}{In\ N}$ . . . iv

RESULTS

Composition and abundance of macrobenthic invertebrates collected in Gubi dam were showed in table 1. A total of 105 individuals benthic invertebrates belonging to 7 orders and 8 families were identified. Hemiptera had two families while Neotaenioglossa, Diptera, Plecoptera, Coleoptera, Odanata, and Ephemeroptera had one family each. *Aquarius remigis* (43) and *Goniobasis livescens* (29) were the most abundant benthic invertebrates caught in Gubi dam while the least abundant species were *Ranatra elongata* (2.86), *Dytiscus marginalis* (2.86) and *Tanytarsus sylvaticus* (0.95). Spillway had more individuals benthic fauna (40) than Tatumari (33) and Polo (32).

Diversity indices of benthic invertebrates in the study area were in Table 2. Simpson's, Shannon, Evenness and margalef's indices were 0.26, 1.56, 0.75 and 1.50 respectively.

Table 1: Composition and Abundance of Macrobenthic invertebrates in Gubi dam

Order	Family	Species	Location And Abundance			Total(%)
			Head water (Tatumari)	Middle water (Polo)	Tail water (Spillway)	
Hemiptera	Gerridae	*Aquarius remigis*	16	18	9	43(40.95)
	Nepidae	*Ranatra elongata*	2	0	1	3(2.86)
Neotaenioglossa	Pleuroceridae	*Goniobasis livescens*	4	7	18	29(27.62)
Diptera	Chironomidae	*Tanytarsus sylvaticus*	0	1	0	1(0.95)
Plecoptera	Perlidae	*Acroneuria carolinensis*	2	3	0	5(4.76)
Ephemeroptera	Baetidae	*Baetis bicaudatus*	4	1	1	6(5.71)
Odonata	Gomphidae	*Paragomphus genei*	4	0	11	15(14.29)
Coleoptera	Dytiscidae	*Dytiscus marginalis*	1	2	0	3(2.86)

Table 2: Diversity and Dominance Indices of Benthic invertebrates in Gubi Dam

Parameters	Values
Margalef's species richness (d)	1.50
Evenness index (E)	0.75
Shannon index (H')	1.56
Simpson's index (D)	0.26
Simpson's reciprocal index (D')	3.78

DISCUSSION

A total of 8 species comprising of 105 individuals shared within 7 orders and 8 families were recorded in this study. The species diversity of the macrobenthic organisms in the dam were less diverse compared to those reported by Asibor (2015) in Asijire reservoir, similarly, it also varied from a total of 19 species belonging to 4 phyla, 6 classes and 12 families identified by George *et al*. (2009) at Okpoka creek and 28 species identified by Ezekiel *et al*. (2011) at Sombreiro River, Niger Delta. These differences are attributable to difference in location, time, nutrient availability and prevailing physical and chemical characteristics of these aquatic bodies Iyagbaye*et al*. (2017).

Hemipterans were presence at all the 3 sampling stations and were the most abundant macrobenthic encountered. Diptera appeared only in Polo sampling station. Orders recorded at the tail water (Hemiptera, Neotaenioglossa , Ephemeroptera and Odonata) were fewer when compared with those at the head water (Hemiptera, Plecoptera, Ephemeroptera, Neotaenioglossa, Odonata and Coleoptera) and the middle water (Hemiptera, Diptera, Neotaenioglossa, Ephemeroptera, Odonata and Coleoptera), this could be as a result of great waste discharge in the tail water due to more intense human activities.

Higher diversity results when many species have equal or near-equal opportunity to co-exist. Mckintosh (2000), in support of this, observed that in the absence of disturbance, community composition may be strongly influenced by abiotic interactions such as competition and predation. Simpson's dominance index in this study was low (0.26). Evenness value was 0.75 indicating that the benthic invertebrates were evenly distributed. The high evenness and low dominance indices in this study indicates high diversity of benthic invertebrates in Gubi dam, since the higher the evenness the higher the diversity, and the lower the dominance index, the higher the diversity(Ogbeibu and Victor,1989). Shannon index was 1.56 and species richness was better (1.5).

CONCLUSION

A total of 105 macro benthic invertebrates represented by seven (7) orders and eight (8) families were recorded in Gubi dam. The benthic invertebrates were diverse with *Aquarius remigis* dominating the total catch. It is recommended that physicochemical parameters of the dam be studied. Also similar research should be carried out in more water bodies in Nigeria.

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