MACROBENTHIC FAUNA OF A HUMID TROPICAL WATER RESERVOIR, ABIA STATE, NIGERIA

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ABSTRACT

The macrobenthic fauna of a humid tropical zone water reservoir was investigated from January to December 2002. Benthos was obtained using an improvised Surber Stream Bottom Sampler. Three phyla of macrobenthos (Arthropoda, Mollusca and Annelida) prevail in the reservoir, with quantitative variations. A total of 1,279 macrobenthic animals were recorded. The Arthropoda was represented by larvae of five genera of insects, with a total of 644 (50.4 %), while Mollusca was represented by two genera with a total of 165 (12.9 %), and Annelida by three genera, with a total of 470 (36.7 %) of the benthos. There was significant difference (P<0.05) among the phyla populations of the benthos.

Keywords: Macrobenthic, fauna, Humid, Tropics, Water reservoir

INTRODUCTION

The water reservoir is located in the National Root Crops Research. Institute (NRCRI), Umudike. This Institute is situated 8 kilometers south east of Umuahia, in Abia State. The reservoir was impounded in 1965 from a tributary of the river Qua-Iboe, which passes through the Institute, for irrigation of farms during dry seasons. As a result of the long existence of the reservoir, and erosion of the banks, it has become a large body of water, with an estimated surface area of 15.5 km^2. (Avoaja, 2005) The climate of Umudike is typical of the humid tropics, with fairly even and uniform temperatures throughout the seasons of the year (Iloeje, 1980). The rainy season usually starts from March and ends in October, with relatively constant temperature, frequent rains, and high humidity (Iloeje, 1980).

Both qualitative and quantitative studies on the benthos of lenthic and lotic waters abound in literature (Williams and Hynes, 1971). Poor taxonomic knowledge of African freshwater faunas in general, allows few groups to be identified beyond the generic level, thus limiting detailed analysis of benthic communities. (Williams and Hynes, 1971) According to Vareschi and Vareschi (1984), the benthic fauna of lake Nakuru (Kenya) was remarkably poor in species, which consisted two chironomid species. Lake Chad in contrast had 47 chironomids (Dejoux, 1968). Nematodes were found only very occasionally and the undersides of stones along the western shores of the lake were populated by the coleopteran, *Helochares species (Hydrophiliidae).* Characteristic benthic species of other lakes e.g. Oligochaetes, Chaoberides, Ostracods or Molluscs were completely absent in lake Nakuru (Vareschi and Vareschi, 1984). In a tropical flood river basin, the common invertebrate taxa were crustaceans, insect and gastropod mollusks (Ezenwaji, 1982; Okafor, 1990; Eyo and Ekwonye, 1995). Banerjee and Banerjee (2005) identified five types of macrobenthic fauna (Oligochaeta, Polychaeta, Crustacea, Gastropoda, and Bivalva) in three Indian estuaries.

Imbevbore and Bakare (1970) reported that most benthos and macroinvertebrates fed on the debris that settled at the bottom of water, and in turn served as food for a wide range of fish. Similar observations have been reported (Moss *et al.,* 1987; Eyo and Ekwonye, 1995). The identification of the benthos of this reservoir would give an insight into the natural fish food of the water body. The present paper embodies a study of macrobenthic fauna of the reservoir in Umudike, which adds to the knowledge of distributions and abundance of macrobenthic fauna in tropical freshwater ecosystem.

MATERIALS AND METHODS

Investigation was carried out in the reservoir from January to December 2002. The reservoir was divided into six sampling stations by a transact method. The six sampling stations were approximately two kilometers apart. That gave a stratified sampling station in which sub-divisions of the stations were sampled using a random sampling technique.

Benthos were sampled using an improvised Surber Stream Bottom Sampler, (a net 0.5 cm mesh, with an area of 900 sq. cm, on a metal frame). A sampling site in each of the stations was selected. The net was dipped inside the water (about 0.5 m depth) collecting mud with the edge of the square metal, into the net. The procedure was repeated five times, and each sample was put into different jars. The jars were labeled indicating the number of replicates, and then carried to the laboratory.

Table 1: Monthly macrobenthos collections from the reservoir

Months	Annelida			Mollusca		Arthropoda					Total	
	Nais batata	*Nais simplex*	*Glossiphonia sp.*	*Lymnaea sp.*	*Physella sp.*	*Chironomus sp larvae*	*Dysticus sp. larvae*	*Copelatus sp. larvae*	*Letes sp larvae*	*Ecdyonurus sp. larvae*		No. / M^2
Jan.	7	8	14	5	5	12	8	8	13	10	90	18
Feb.	11	8	10	9	5	12	11	10	11	12	99	19
Mar.	12	14	16	11	4	7	13	8	9	10	104	21
Apr.	13	15	17	10	5	10	8	11	13	14	116	23
May	11	15	14	14	8	8	8	6	11	12	107	21
Jun.	11	11	27	7	7	8	4	9	14	13	111	23
July	13	13	22	6	5	3	8	14	11	14	109	23
Aug.	7	6	32	8	7	13	12	9	13	15	122	23
Sept.	10	12	35	9	7	6	7	7	9	8	110	22
Oct.	7	6	19	6	5	15	17	9	15	14	113	23
Nov.	8	7	13	5	5	13	15	13	13	14	106	21
Dec.	8	7	11	8	4	10	11	10	11	12	92	20
Year	**118**	**122**	**130**	**98**	**67**	**117**	**122**	**114**	**143**	**148**		
Total Phyla		**470**			**165**			**644**				
Total % age		**36.7%**			**12.9%**			**50.4%**				

Table 2: Benthos distribution in stations in the water reservoir

Phylum	Class	Order	Family	Species	Stations					
					1	**2**	**3**	**4**	**5**	**6**
Annelida	Oligochaetae	Naidida	Naididae	*Nais Simplex*	-	-	+	+	+	+
				Nais batata	-	-	+	+	+	+
"	Hirudinea	Gnaltodbella	Glossiphoniidae	*Glossiphonia complonata*	+	+	+	+	+	+
Arthropoda	Insecta	Diptera	Chironomidae	*Chironomus sp.(larvae)*	+	+	+	+	+	+
Arthropoda	Insecta	Coleoptera	Dytiscidae	*Dysticus marginalis* (larvae)	-	+	+	+	+	-
"	"	"	"	*Copelatus* sp. (larvae)	-	+	+	-	-	-
"	"	Odonata	Lestidae	*Lestes* sp. (larvae)	+	+	+	+	+	+
"	"	"	"	*Ecdyonurus* sp. (larvae)	+	+	+	+	+	+
Mollusca	Gastropoda	-	Lymnaeiidae	*Lymnaea natalensis*	-	-	+	+	+	-
"	"	-	Physidae	*Physella sp.*	-	-	+	+	+	-

Key: *+ Present, - Absent*

In the laboratory, the contents of each jar were poured into a white enamel pan. The material from each enamel pan was then poured into a fine sieve (a no. 40 U.S. series sieve) to remove water, sand and debris. The organisms in the sieve were sorted out manually, and separated into taxonomic groupings for final identification and enumeration. The procedure was carried out for each of the six stations. The number of benthos per square meter was computed using Lind (1979) thus: umber of benthos per meter = Total no per month / Total area sampled (m^2) where, Total area sampled =area of net x No of replicates.

The animals recovered were put into specimen bottles, labelled, and preserved in 4 % formaldehyde solution for further examination. These specimens were identified using keys (Edmondson, 1966).

Statistical Analysis: SPSS version 10 employing simple percentiles and graphs were used in analyzing

the population of macrobenthic fauna of the reservoir.

RESULTS AND DISCUSSION

The benthic fauna was represented by three animal phyla, Annelida, Mollusca, and Arthropoda. The annelids were Oligochaetes, represented by *Nais simplex* and *Nais batata* and Hirudinea represented by *Glossiphonia complonata*. The Molluscans were the Gastropods, represent by *Lymnaea natalensis* and *Physella* sp. The Arthropods were mainly larvae of insects, represented by the larvae of *Chironomus sp.*; *Dysticus sp.*; *Copelatus sp.*; *Lestes* sp. and *Ecdyonurus sp*. (Table 1). A total of 1,279 benthic specimens were collected during the year. The minimum and maximum benthoses per square metre were recorded. 18 and 23 respectively. The record showed that in terms of number, Arthropoda was the highest with 644 (50.4 %), followed by the Annelida, 470 (36.7 %), and the least was the Mollusca, 165 (12.9 %). Table 2 shows the benthic distribution in the stations.

The Gastropods were found in stations 3, 4 and 5. The insect larvae were found almost in all the stations but stations 1 and 6 recorded no *Dysticus sp*. larvae, and stations 1, 4, 5 and 6 recorded no *Copelatus* larvae. There were significant differences ($P < 0.05$) between the phyla of the macrobenthos of the reservoir.

Benthic organisms play several important roles in the aquatic community. They are involved in the mineralization and recycling of organic matter produced in the open water or brought from external sources (Moss *et al;* 1987). They are important second and third links in the trophic sequence of aquatic communities (Moss *et al;* 1987). Many benthic insect larval forms are major food sources for fishes (Lind, 1979). These insect larvae identified in this study were probably food for both the young and adult fishes in the reservoir. Few animals which have the ability to exploit the benthic mud region of lakes and reservoirs, because of low oxygen tension arising from decay of organic matter, survive. Therefore, the degree of specialization required from the organisms in order to survive in the mud region means that the number of species will be limited (Brown, 1971).This probably, accounted for the few molluscans and Annelids recovered in this study.

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