

Status and the Diversity of Macrobenthos of Udu - Ghievwen Wetlands in the Niger Delta, Nigeria

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Abstract

A survey on the status and diversity of benthic fauna community of Udu – Ughievwen wetlands was carried out for a period of six months. Benthic samples were collected using the Ekman Grab made by Hydrobios. Water Hyacinth (*Eichornia crassipes*) was also sampled for benthic organisms. A total of twelve taxonomic groups were recorded in this study and they include; Ephemeroptera (37.63%), Diptera (20.45%), Decapoda (14.39%), Odonata (6.48%), Annelida (5.97%), Coleopterans (4.21%) and Trichoptera (3.87%). Others were; Mollusca (3.45%), Amphibian (2.85%), Hemiptera (2.27%) and Arachnida (0.42%). The highest number of individuals was collected from Ohwawha (171) and least at Ofri (60). Shannon – Weiner diversity (H) was highest at Ujevuu and least at Ofri sampling stations respectively. The suitability and diversity of the macrohabitats in the various study sites have favoured the abundance of benthic macroinvertebrates particularly the Decapoda, Ephemeroptera, and Diptera in these water bodies. The dominance of Ephemeroptera in most of the sites indicates a healthy nature or sound environmental quality of the entire Udu – Ughievwen wetlands. The study revealed that wetlands are populated by a rather different assortment of macroinvertebrates.

Keywords: Dominant, Wetlands, Macrobenthos, Niger Delta, Biodiversity.

1.0 INTRODUCTION

Studies on the flora and fauna of terrestrial and aquatic ecosystems in Nigeria have received quite impressive attention over the past two decades in Nigeria. The composition, abundance and diversity of species in lotic and lentic habitats have been recorded through the earlier works on aquatic macrophytes and algae (Imevbore, 1962, 1971; Adeniji, 1973; Egborge, 1974), planktonic rotifera and crustacean (Green, 1960; Gabriel *et al.*, (1987).

But the integral role of Nigerian wetlands in the ecology of the watershed has grossly been neglected. Our wetlands have received little or no attention, even though they are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. What are basically wetlands? They are areas where land and water meet and are wet for an ecologically significant part of the year. Wetlands may be temporally flooded each day as with tidal marshes or be filled seasonally with water from melting snow (The Volunteer Monitor, 1998).

Plants and animals present in wetlands are from land and water habitats making them highly productive environments. Undoubtedly, an immense variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish and mammals can be part of a wetlands ecosystem. Hence studies on wetlands could be of great interest and may be individually recognized for their endemic species and form the vital link between our land and water resources. The biodiversity in wetlands is also valuable as a reservoir of genes.

Reports of investigations of Wetlands plants and animals of Nigeria are not readily available although such studies are useful for the provision of natural products for our use at no cost. Therefore, this work is important as a baseline reference sources and to highlight the reservoirs of biodiversity in Udu Wetlands.

2.0 Study Area

Udu-Ughievwen clans lie within Latitudes $5^{\circ}24'$ – $6^{\circ}20'$ E and Longitude $5^{\circ}21'$ – $6^{\circ}00'$ N covering a total surface area of about 15sq.km (Fig. 1). The catchment area is dominated by two distinct annual seasons; the rainy and dry seasons. The former, which begins from about April and extends to October/November, is characterized by very high rainfall, high relative humidity and rather low temperatures.

Rainfall peak of 650mm was obtained in October 2003 and lowest value of 26mm in April, 2003; with appreciable rainfall also recorded in September. The dry seasons begins from November to early April. Rainfall during this period ranges between 06 and 210mm with low relative humidity of 70 to 85%.

3.0 Materials and Methods

3.1 Benthic Fauna

Macrobenthic fauna studies was carried out for six months by sampling the bottom substratum using an Ekman grab (made by Hydrobios, West Germany) as recommended for sand and silt (Hynes, 1961, Elliot, 1977).

Contents trapped by the grab were processed as described by Olomukoro and Victor (2001). Water hyacinth (*Eichornia crassipes*) was also sampled for benthic organisms using the method of Olomukoro, (1996).

The Benthic Macroinvertebrates were identified using the following relevant literatures: Pennak, (1953), Macan, (1959), Needham and Needham, (1962), Mellanby (1963), Hynes, (1970), Powell, (1983) and Olomukoro, (1996).

3.2 Data analysis

The macrobenthic data obtained were subjected to biological indices to determine; taxa richness (D), evenness (E) and Shannon-weina diversity (H) (Olomukoro and Eloghosa, 2009) using the biological index method for taxa richness, evenness and that of Shannon-weina .

4.0 RESULTS

4.1 Macrobenthic Fauna

The composition, relative abundance and distribution of Macrobenthic fauna in five water bodies (rivers and ponds) are presented in table 1. The macrobenthic invertebrates comprise 2 species of Nematoda, Oligochaeta (5), Polychaeta (3), Hirudinea (4), Decapoda (9), Ostracoda (1), Ephemeroptera (9), Odonata (7) and Hydracarina (1). Others are Hemiptera (5), Coleoptera (4), Trichoptera (5), Diptera (9), Mollusca (9) and amphibian tadpoles (3). In all, forty (40) taxa were recorded in the study areas.

Fig. 2 shows the percentage contribution of major taxonomic groups to the total macro-faunal population. Comparison of the relative composition of the benthic groups in all the water bodies revealed; Ephemeroptera had the highest record of 37.62% and lowest (0.16) was recorded for Nematoda. Insecta accounted for between 70% and 81% of the species composition while the Dipteran accounting for 22 – 27% in the study water bodies. Oligochaeta, Hirudinea and Decapoda had 5.96%, 6.06% and 14.39% respectively. In all the water bodies except in Aladja and Otorogu, Mollusca were observed to be conspicuously absent. Of the total assemblage of benthic organisms recorded, 16.50% density were concentrated in Okwagbe Rivers and closely followed by Owahwa stream with 14.39% density, while Ofori had the lowest density of 5.05%.

Taxa richness (D) for biodiversity was highest at Okwagbe (6.06) and least at Ujevwu (2.46). Shannon-Weiner diversity recorded fair values of slightly less than or slightly greater than 1.0. All the species collected showed equitable distribution except for Ujevwu (0.57).

5.0 DISCUSSION AND CONCLUSION

The community structure of the Macrobenthic fauna of Udu-Ughievwen wetlands is quite Unique. The suitability and diversity of the macrohabitats in the various study sites have favoured the abundance of benthic macroinvertebrates particularly the Decapoda, Ephemeroptera and Diptera in these water bodies.

The dominance of Ephemeroptera in most quality of the sites indicates a healthy nature or sound environmental quality of the entire Udu-Ughievwen wetlands. The spatial variations in the diversity of benthic species corresponded closely to two of Thienemann's principles, (Mackie, 1998) which clearly states that:

- i. The greater the diversity of conditions in a locality, the larger the number of species that make up the community.
- ii. The longer a locality has been in the same condition the richer is its biotic community and the more stable it is.

The abundance of Coleoptera larvae in Owahwa stream was 84% of this group collected in all the study sites and were not found surprising. Owahwa stream which is shallow and relatively calm, with low velocity, flows through a dense tropical swamp forest where both adults and larvae were commonly encountered. Adults are considered better indicators of water because they have been subjected to water quality conditions over longer period (Hynes, 1970).

In Conclusion, the study revealed that wetlands are populated by a rather different assortment of macroinvertebrates. One glaring difference is that Plecoptera (Stoneflies), a highly pollution sensitive group whose presence is hallmark of stream health, are absent from Udu wetlands.

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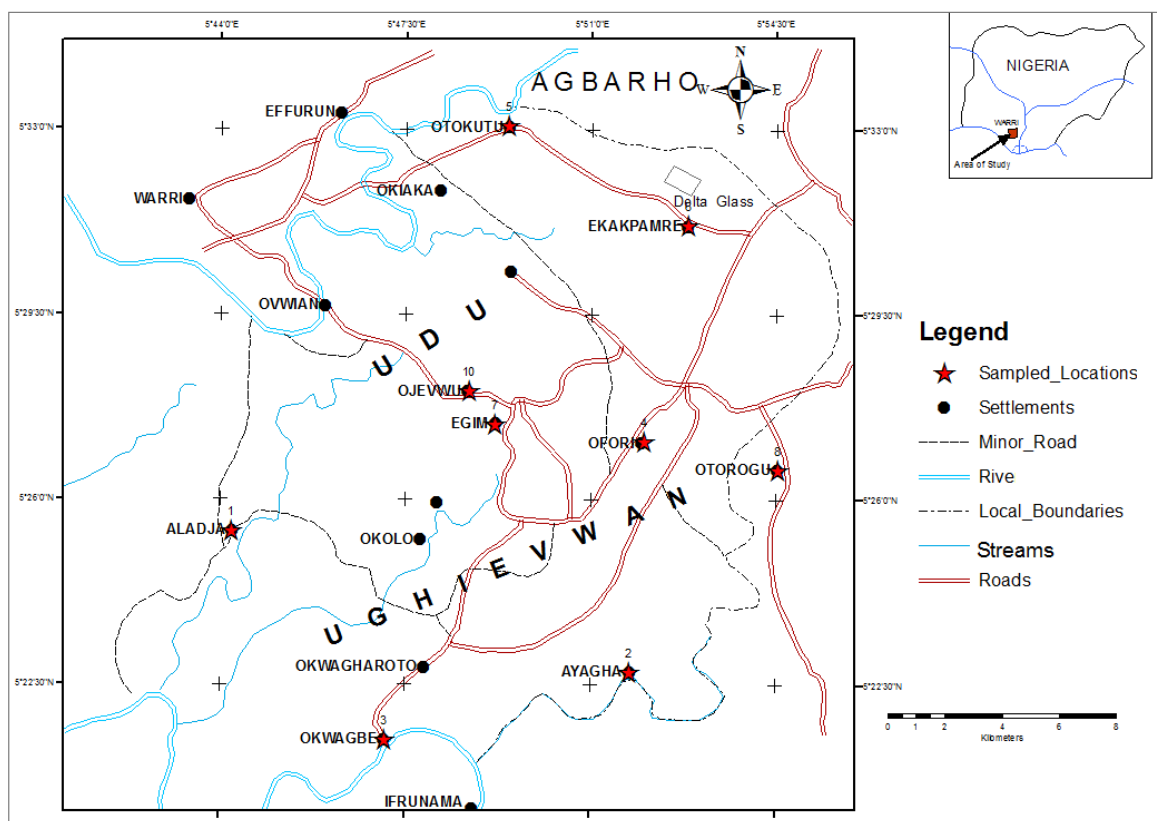


FIG. 1: MAP OF UDU AND UGHIEBVWEN SHOWING SAMPLING STATIONS

Table 1: Abundance and Distribution of Macrofauna in the Wetlands of Udu and Eghievwen

Taxa	Aladja	Ayagha	Okwagbe	Ofori	Otokutu	Ekakpamre	Egini	Otorogu	Ohwawha	Ujevwu	TOTAL
Nematoda											
<i>Dorylamus sp.</i>							1				1
<i>Rhabdolainus sp.</i>		1									1
Oligochaeta											
<i>Aulophorus furcatus</i>					1						1
<i>A. vagus</i>									1		1
<i>Nais sp.</i>		9	12		3	1	2	1	4	1	33
<i>Naidium sp.</i>		4	5						1		10
Polychaeta											
<i>Lycastopsis sp.</i>	2										2
<i>Namanereis sp.</i>	1										1
<i>Nereis sp.</i>	8										8
Hirudinea											
<i>Hirudo medicinalis</i>	1										1
<i>Haemopsis sp.</i>	2	1	1		2	4					10
<i>Placoebdella sp.</i>					1						1
<i>Theromyzon sp.</i>			2			1					3
Decapoda											
<i>Caridina africana</i>							21				21
<i>C. gabonensis</i>							5				5
<i>Desmocarid trispinosa</i>			1		4	13	2	4	2		26
<i>D. bislineata</i>	2										2
<i>Euryrhynchina edingtone</i>									1		1
<i>Potamalpheops monodies</i>	27		35		20	1		1	19		107
<i>Leander tenuicornis</i>			4								4
<i>Sesarma alberti</i>	2				1						3
<i>Ostracoda</i>	2	3			2				1		8
Coleoptera											
<i>Dytiscus sp.</i>			4						1		5
<i>Dyticus marginalis</i>			2		1				2		5
<i>Hyphydrus ovatus</i>									2		2
<i>Deronectes sp.</i>								1	37		38
Trichoptera											
<i>Agraylea sp.</i>		2				2					4
<i>Hydroptila sp.</i>		2	5		1	3				1	12
<i>Leptocerid sp.</i>			2	1	1			1	2		7
<i>Limmophilus sp.</i>		10	5		1			2	1	2	21
<i>Oxyethira sp.</i>			1								1
Diptera											
<i>Chironomus travalensis</i>				1			14		2	3	20
<i>Chironomus sp.</i>		24	18	1	18	7		12	1	8	89
<i>Pseudochironomus sp.</i>		1	2		1		1	2		2	9
<i>Tanypus sp.</i>		3	6	8	8	1	1	2		6	35
<i>Tanytarsus sp.</i>				2	5			1	2	2	11
<i>Clinotanypus sp.</i>		3	12	2		2					19
<i>Corynoneura</i>		1	1	2							4
<i>Pentaneura sp.</i>			7		4	1	2	11		5	30
<i>Insect larva</i>		7	1	1	8		1	7	1		26
Mollusca											
<i>Hydrobia sp.</i>	2										2
<i>H. guyenoti</i>	1										1
<i>H. lineate</i>	1										1
<i>Neritina glabrata</i>	15										15
<i>Limnaea auricularia</i>								1			1
<i>Potamopyrgus sp.</i>	1										1
<i>P. ciliatus</i>	2										2
<i>Tympanotonus radula</i>	17										17
<i>T. fuscatus</i>	2										2
Ephemeroptera											
<i>Adenophebiodes sp.</i>	2					1				2	5
<i>Baetis sp.</i>	8	11	5	7	14	3	14	3	5	7	77
<i>Centroptilum sp.</i>	3	17	9	7	17	4	8	3	12	5	85
<i>Cloeon sp.</i>	10	38	25	25	29	5	24	3	35	25	224
<i>Ephemerella ignita</i>				2					1	2	5

<i>Habrophlebia sp.</i>					1				1	2	4
<i>Heptagenia sp.</i>		1	3	1		2	1				8
<i>Hexagenia sp.</i>		1									1
<i>Pseudocloeon sp.</i>					1						1
Odonata											
Anisoptera											
<i>Libellula sp.</i>	3	10	14			2	4	1	2	2	42
<i>Aphyla sp.</i>					1						1
<i>Plathemi sp.</i>	1	2									3
<i>Orthemi sp.</i>	1	1	1							1	4
Zygoptera											
<i>Coenagrion sp.</i>					2				6	1	10
<i>Enallagma sp.</i>		1	2			3	3	1	2	4	15
<i>Lestes sp.</i>						1	1		1	3	6
Hydracarina											
<i>Argyroneta aquatic</i>					2	1		1			4
Hemiptera											
<i>Geris sp.</i>					1			1		1	2
<i>Ilyocoris sp.</i>			2		4			2	2		10
<i>Nepa sp.</i>					1			1			2
<i>Notonecta sp.</i>		3	3		1	1					8
Unidentified Hemiptera			2						2		4
Arachnida											
<i>Megapus sp.</i>									1		1
<i>Water mite</i>						2		2			4
Amphibian											
<i>Bufo sp.</i>					4	1				1	6
<i>Bufo calamita</i>			1		3	1			20		25
<i>Rana sp.</i>			2							1	3
Pisces											
<i>Mastacemblus sp.</i>			1		1	2			1		5
No. of Taxa	25	25	33	13	34	25	17	22	31	12	1188
Total No. of Organisms	116	156	195	60	160	65	103	64	169	87	1175
Margalef's Index (D)	5.00	4.73	6.06	2.93	5.76	5.76	3.45	5.07	5.84	2.46	
Shannon-Weiner (H)	1.16	1.12	1.25	0.84	1.25	1.25	0.97	1.16	1.11	1.41	
Evenness (E)	0.36	0.35	0.36	0.33	0.39	0.39	0.34	0.38	0.32	0.57	

Table 2: The Contribution of Major Taxonomic groups to the total Macrofauna Population

Taxa											TOTAL	% Occurrence
	Aladja	Ayagha	Okwagbe	Ofori	Otokutu	Ekakpamre	Egini	Otorogu	Ohwawha	Ojevwu		
Nematoda		1					1				2	0.16
Annelida	14	14	20		7	6	2	1	6	1	9	5.97
Decapoda	32	4	40		26	14	28	5	22		8	14.39
Ephemeroptera	23	68	42	42	62	15	47	9	54	43	10	37.62
Odonata	6	13	17		3	6	7	2	11	12	9	6.48
Hemiptera		3	7		7	1		4	4	1	7	2.27
Arachnida						2		2	1		3	0.42
Coleoptera			6		1			1	42		4	4.21
Trichoptera		14	13	1	3	5		4	3	3	8	3.87
Diptera		39	47	17	44	11	19	35	6	25	9	20.45
Mollusca	41							1			2	3.45
Amphibian (Tadpoles)			3		7	2			20	2	5	2.86
Total	116	156	195	60	160	65	103	64	169	87	1175	
Total No. of species	25	25	33	13	34	25	17	22	31	12		

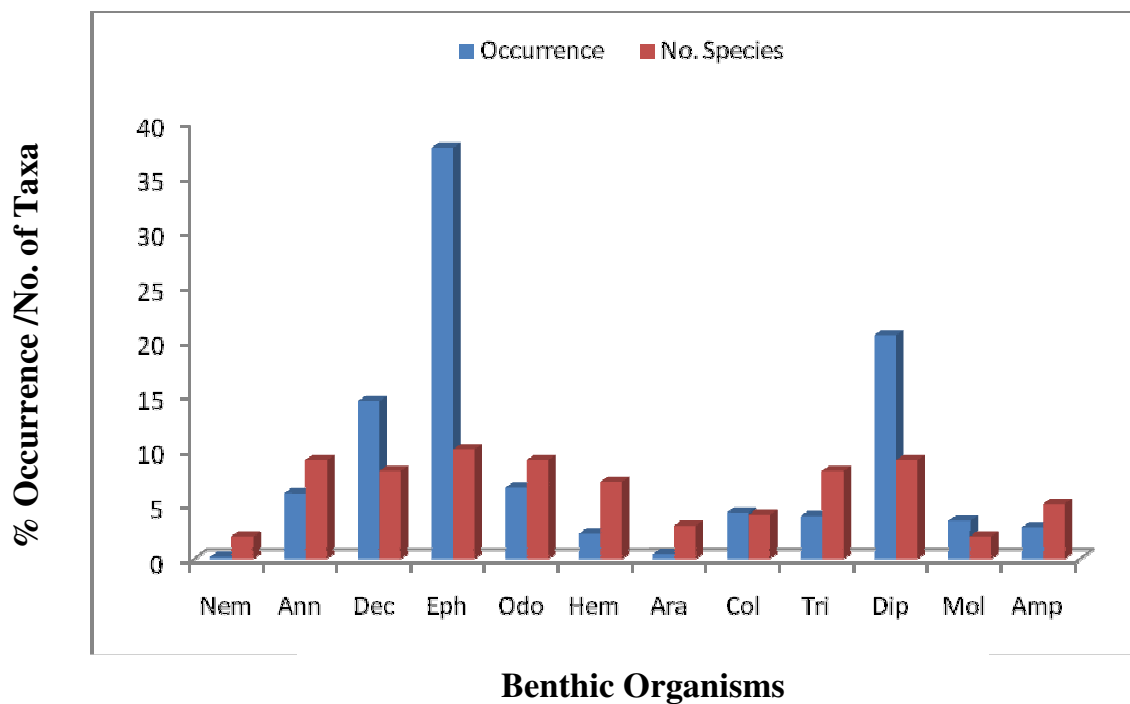


Fig. 2: The Contribution of major Taxonomic groups to the total Macro-fauna Population where: Nem (Nematoda), Ann (Annalelida), Dec (Decapoda), Eph (Ephemeroptera), Odo (Odonata), Hem (Hemiptera), Ara (Arachnida), Cole (Coleoptera), Trich (Trichoptera), Dip (Diptera), Mol (Mollusca) and Amp (Amphibian).

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