POST-IMPACT FAUNAL ECOLOGICAL EVALUATION OF OGBEI STREAM, NKPOLOGWU, AGUATA LOCAL GOVERNMENT AREA, ANAMBRA STATE, NIGERIA

BY

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TITLE PAGE

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DEDICATION

This thesis is dedicated to God the Father, God the Son and God the Holy Spirit in whom I live, move and have my being.

CERTIFICATION

Ibemenuga, Keziah Nwamaka, a postgraduate Ph.D student in the Department of Zoology and Environmental Biology, with Registration Number PG/Ph.D/07/42661 has satisfactorily completed the requirements for the award of the degree of Doctor of Philosophy (Ph.D) in Zoology and Environmental Biology (Hydrobiology). The content of this Thesis is original and has not been submitted in part or full for other certificate, diploma, or degree of this or any other University elsewhere.

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List of Acronyms

Abbreviation	**Meaning**
UNCSD	United Nations Commission on Sustainable Development
FAO	Food and Agricultural Organization
CEPA	Commonwealth Environment Protection Agency
SOS	Save Our Stream
NWSTN	National Water Supply Training Network
USEPA	United States Environmental Protection Agency
NIFFR	National Institute for Freshwater Fisheries Research
NSWDPI	New South Wales Department of Primary Industries
DPRM	Department of Petroleum Resources Manual
APHA	American Public Health Association
ASTM	American Society for Testing and Material
WHO	World Health Organization.

ABSTRACT

The impact of concrete structure on the distribution and abundance of fauna and environmental variables were investigated in Ogbei Stream, Nkpologwu, Anambra State, Nigeria between May 2008 and April 2009. Zooplankton, macro-invertebrates and fish samples were collected fortnightly for a period of twelve months from six stations. The physico-chemical conditions were determined using standard methods. Zooplankton communities were sampled using a plankton net with mesh size 80 µm, collecting bottle, 300 ml plastic bottles and a seven (7) liter bucket. The macro-invertebrates were sampled using a scoop net, kick sampling technique, surber bottom stream sampler and a serrated core sampler (SCS). Fish sampling was done with nets. Water temperature in station 1 differed significantly ($P < 0.05$) from all other stations. Transparency was significantly different ($P < 0.05$) among the stations. T-test of seasonal variations of physical-chemical variables showed that all factors with the exception of conductivity, hardness, nitrate-nitrogen, phosphate-phosphorus and sodium were significantly different ($P < 0.05$). Pre- and post-impact data compared showed that hardness and transparency were significantly different ($P < 0.05$) in all the stations except Stations 1 and 3 respectively. Alkalinity and phosphate-phosphorus were significantly different ($P < 0.05$) in all the stations. Twenty eight (28) species of zooplankton distributed into seventeen 17 families and (7) orders were encountered in the stations. *Brachionus patulus* of the order Ploima was the most abundant taxon. The low zooplankton fauna experienced in Station 1 showed a strong evidence of impact arising from the concrete structure and human activities at that station. Physico-chemical parameters explained 89.4% of variation using principal component analysis (PCA). In the macro-invertebrate communities, five (5) classes were documented. Insecta was the dominant class. Of the forty-three (43) taxa identified, dipterans were dominant. The dominant taxon was

Chironomous transvalensis (17.38%). Macro-invertebrates abundance was highest in Station 2 and lowest in Station 1. They occurred more in the dry season than in the rainy season. Diversity of macro-invertebrates was low in Station 1. Principal component analysis (PCA) of macro-invertebrates explained 86.5% variation in the data set. Macro-invertebrate abundance was low in post-impact study compared to pre-impact study due to perturbational stress arising from construction of concrete structure in Ogbei Stream. Fish were represented by six hundred and ninety-four (694) individuals belonging to fifteen (15) taxa and ten (10) families of six (6) orders with Cichlidae family (33.57%) being dominant quantitatively. Overall composition was dominated by *Sarotherodon galilaeus* (30.98%). Seasonally, *Sarotherodon galilaeus* (1.32 ± 0.128) was highest in the dry season. Principal component analysis explained 88.1% of the Pisces order and physico-chemical parameters. Conclusively, concrete structure did not only impact water quality adversely but also altered the distribution and abundance of zooplankton, macro-invertebrates and fish species in Ogbei Stream.