USING BENTHIC MACROINVERTEBRATES AS BIOINDICATORS OF CONDITIONS IN THE OSIA STREAM IN TORORO

BY

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DECLARATION

I Akello Patricia declare that this research report is my own original work and it has not been submitted for any academic qualifications at any other university or institution.

..... 16th/05/2023.....

Signature Date

APPROVAL

This report has been submitted for examination to the Faculty of Science and Education, Busitema University with approval of my supervisors.

Supervisors

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DEDICATION

This research work is dedicated to my beloved parents Mr Oloka Vincent and Ms Nyadoi Lillian, Aunt Justine Athieno, my brothers and sisters who have supported me. May the Lord add you more years of success, good health and live long to see your great grandchildren.

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ABSTRACT

Macroinvertebrates owing to their wide variation of response to environmental changes have been used to evaluate the water quality and health of aquatic systems. Presence and/or absence of macroinvertebrates can indicate the effects of anthropogenic activities on the aquatic environmental quality. The aim of the study was to assess the conditions in the Osia stream using benthic macro invertebrates as bio-indicators. Selected water quality parameters like dissolved oxygen (DO), pH, conductivity, and temperature were measured in-situ and turbidity in the laboratory using electronic meters. Habitat physical parameters like Stream width was measured using a tape measure and stream depth of the stream was determined using a wooden meter ruler. Samples of benthic Macroinvertebrates were collected using a D-net of 30×60cm then transferred to the white tray for washing and finally preserved in 70% ethanol. The organisms were then taken to the laboratory for sorting**.** The mean and standard deviation for each physical chemical variable was calculated per sampling site. Here Species diversity, abundance and species evenness of benthic macroinvertebrates were evaluated. Physical chemical variables were compared using one way analysis of variance (ANOVA). The physical chemical variable varied along Osia stream dissolved oxygen was highest at site 1 and lowest at site 3, temperature was slightly high at site 1, conductivity was highest at site 1 and lowest at site 2, PH decreased downstream, turbidity was highest at site 3 and lowest at site 2. A total of 12 families of macroinvertebrates from 5 orders were recorded. Thiaridae was the most dominant species. Shannon wiener diversity index and Species evenness were highest (1.58) at site1, moderate (0.5) at site 3 and lowest (0.2) at site 2. These indicated good, moderate and fair water quality respectively. Water quality, habitat physical status and human activities varied along Osia stream which significantly affected the normal diversity and abundance of benthic macroinvertebrates and this indicated that the Osia stream is highly disturbed by human activities. There is need to educate the stake holders and the riparian community on effect of destroying the stream and other environmental related issues.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Macroinvertebrates are organisms that do not have backbones and can easily be seen with naked eyes. They inhabit lakes, streams and rivers. These organisms are called benthos because they live at the bottom of substrates for all or part of their life cycle. They are found attached to rocks, vegetation, logs, stick or burrow in to the bottom sediments (Mariadoss, 2016).

The benthic macroinvertebrates include insect larvae such as stone flies, mayfly nymphs, aquatic worms, crustaceans such as Cray fish, gastropods forexample snails and beetles (Chamia, 2022). Benthic organisms contribute a lot to the food chain because their death and decay are used by aquatic plants and animals.

Macroinvertebrates perform important functions including decomposition of organic matter hence forming a basis of many aquatic food chains. These benthic macro invertebrates are capable of living in any freshwater ecosystem as long as the water is not deep and not extremely polluted (Chamia & Kutuny , 2022).

Freshwater ecosystems are essential for the survival of all species including human beings, plants and animals comprising invertebrate forms such as annelids(worms),crustaceans ,insect larva and Mollusca(Huang1, 2018). These freshwater ecosystems exhibit high biodiversity and provide a wide range of ecosystem services for the local communities who depend on them for their livelihood particularly the fishing and agricultural sector (Yusuf, 2019).

However as a result of increasing population in Uganda, this has led to increased demand for land and water, hence leading to increased reclamation of the catchment areas so as to create land for settlement, agricultural activities through cultivation, channel diversions (Shibata2, 2017). This has altered the natural flow regimes of the streams and rivers leading to loss in biodiversity of the aquatic species as a result of habitat loss, increased water pollution and accumulation of sediments. Farming alters the water and sediment quality which negatively affects the aquatic organisms (Shibata2, 2017).

Freshwater ecosystems have seen the largest decline in biodiversity globally especially the lotic ecosystems. This has been particularly impacted by human activities around these ecosystems. The main drivers of environmental change relate primarily to agriculture, urbanization and

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