

USE OF BENTHIC MACRO-INVERTEBRATES FOR POLLUTION MONITORING IN OXIDATION PONDS

Okuku E.O^{1,2}, J.A. Okello² and J.O. Manyala³

¹ ECOMAMA, Vrije Universiteit Brussels
Pleinlaan 2, 1050, Brussels, Belgium
E mail: eokuku@vub.ac.be

² Kenya Marine and Fisheries Research Institute
PO Box 81651, Mombasa, Kenya

³ Moi University
po Box 3900, Eldoret, Kenya

World's population is increasing at an alarming rate. This increase is coupled with an increase in waste production. Developing countries cannot afford the expensive equipments that require much energy and highly qualified personnel for wastewater treatment thus the wide adoption of the use of oxidation ponds. These ponds are usually left to achieve their objectives with no effective monitoring due to high costs involved in water quality monitoring through chemical analysis. The objective of this study was to develop a tolerance scale of benthic macro-invertebrates that could be used for effective monitoring of changes in levels of pollution in oxidation ponds.

Wastewater samples were collected at the outlet gates of each of the four successive ponds for analysis of nitrites, phosphates, pH and BOD₅. Temperature and dissolved oxygen measurements were taken in situ. The existing macro-invertebrates standing stock and species representation were sampled using surber sampler.

There was a statistically significant reduction in organic load ($p < 0.05$, $F = 93.612$), nitrites ($p < 0.05$, $F = 48.402$) and phosphates concentration ($p < 0.05$, $F = 200.00$) between the influent and the effluent, while pH showed a significant increase ($p < 0.05$, $F = 688.332$). Shannon Wiener species diversity indices showed an increase in species diversity from influent pond (pond 1) to the effluent pond (pond 4). *Chironomus* sp. showed a significant positive correlation to phosphates concentration ($p < 0.05$, $CF = 0.999$) and a significant negative correlation to pH ($P < 0.05$, $CF = -0.977$). *Corixa* sp. showed a significant negative correlation to nitrites ($p < 0.05$, $CF = -0.987$) and BOD₅ concentrations ($p < 0.05$, $CF = -0.987$) and a positive correlation to pH ($p < 0.05$, $CF = 0.967$). *Belistoma* sp. and *Notonecta* sp. showed a significant negative correlation to temperature. From species abundance, a tolerance scale from the most pollution tolerant to the least tolerant of *Chironomus* sp., *Belistoma* sp., *Notonecta* sp., and *Corixa* sp. was developed.

Keywords: Pollution; oxidation ponds; invertebrates and bio-monitoring.