

RESPONSE OF BENTHIC MACROINVERTEBRATE COMMUNITIES IN STREAMS OF CABUYAO, LAGUNA TO SURROUNDING INDUSTRIAL LAND USE

ABSTRACT

Industries are one of the significant sources of pollutants of freshwater ecosystems such as rivers and lakes especially when the effluents are disposed untreated. In the province of Laguna, several industrial parks have been developed in the recent years but the overall health of the river where effluents are released is not assessed in terms of both physico-chemical and ecological parameters. San Cristobal and Diezmo River in Cabuyao, Laguna are freshwater bodies receiving industrial effluents coming from the commercial establishments and factories in the area. Despite this fact, there are only few studies that focus on the effect of industrial effluents in water quality parameters and macrobenthic communities in the river, as well as the interplay of these factors. In this study, the effect of industrial land use to spatio-temporal variation of water quality and benthic macroinvertebrate (BMI) community was studied through stretches of San Cristobal and Diezmo Rivers. Principal component analysis of water quality parameters showed that approximately 39% of the total variability in the primary axis was mainly due to water chemistry wherein pH, ammonia-N, phosphate, and dissolved oxygen (DO) concentration were evaluated to be significant. Results show that downstream areas have high concentration phosphate, ammonia-N, nitrate-N, and biochemical oxygen demand, often exceeding DENR Administrative Order (DAO) 2016-08 levels. Measured DO in the downstream areas (except for Diezmo River) were also non-compliant to DAO 2016-08 set level. For the benthic macroinvertebrate communities in the stream, a total of 3,446 individual benthos belonging to 44 families were obtained from the three stream. In general, there were 14 more taxa identified in the upstream portion, a higher abundance of sampled benthos, and higher diversity indices, as well. Non-metric multidimensional scaling showed clustering of upstream and downstream areas in terms of benthic macroinvertebrate community, which was supported by the results of analysis of similarities. Similarity percentages reveal that Chironomidae and taxa from Ephemeroptera-Plecoptera-Trichoptera were primarily responsible for the observed dissimilarities in the upstream and downstream areas. Lastly, canonical correspondence analysis results revealed that measured water quality parameters have accounted for the 62% of the variation observed in benthic macroinvertebrate assemblage wherein significant water quality parameters include ammonia-N, nitrate-N, phosphate, DO, and BOD₅.