

## Impacts of Land Use on Water and Sediment Quality of Sampadi River, Malaysia

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**Abstract:** Aquaculture is an important industry in Malaysia due to water availability. Recent commercial crop development in the Sampadi River watershed may have an impact on the water quality of the river. Therefore a study was conducted to determine the water and sediment status of selected stations along that river. Results showed that oxygen demand, nitrogen and phosphorus in the water at all stations were higher at low tide than at high tide except reactive phosphorus at the station near shrimp culture. The station near oil palm plantation showed the lowest pH and DO, the highest TKN and RP and the second highest in COD in the water and the highest in TOC, TKN and TP in the sediment. The station near shrimp farming showed the highest COD, second highest TKN and the highest high tide water reactive phosphorus. In addition, sediment copper and TKN was the highest and second highest among the stations. The station that was near the residential area was the highest in low tide reactive phosphorus and the second highest in BOD<sub>5</sub>, the highest in sediment lead and cadmium.

**Key words:** Oil palm · Sediment · Nutrients · Trace metals · Water quality

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### INTRODUCTION

Due to the growing demand of animal protein in the world and the inability of capture fisheries to provide the needed fisheries products, most of the increase in demand has to be met by aquaculture [1]. Since both natural aquatic organism and aquaculture require unpolluted water, river water has to be conserved for the production of aquatic animals. The Sampadi River, situated 62 km away from the city of Kuching is a good site for aquaculture as there was no urban development in the watershed. However, in recent years, there were some new agriculture activities such as oil palm crop cultivation in the watershed in addition to shrimp aquaculture and villages.

Different activities in the watershed have different impacts on the receiving water [2] and sediment [3]. Oil palm cultivation has expanded greatly in tropical countries such as Malaysia in recent years to meet the demand of biofuel which is seen as a green solution to fossil fuel and also the looming depletion fossil fuel reserve. In addition, oil from palm is considered a cheaper oil to produce and

the yield of oil palm is also higher as compared to other oil crops used as biodiesel [4]. Malaysia currently accounts for 39 % of world palm oil production and 44% of world exports [5]. As land became scarce in Peninsular Malaysia, expansion shifted to Sarawak and Sabah [6]. However, oil palm agriculture and palm oil processing has the potential to pollute surface water through fertilizer runoff [7] and palm oil mill effluent [8]. Palm oil mill effluent is high in organic matter and nutrients such as nitrogen and phosphorus [9, 10]. Wastewater discharged from residential areas has also been found to affect the quality of surface water as household wastewater is high in organic matter and also nutrients [11, 12, 13]. In view of these, the objective of this study was to determine the water and sediment quality of selected stations in the Sampadi River.

### MATERIALS AND METHODS

**Study Site and Sampling:** Five stations based on land use activities were selected on Sampadi River in