ABSTRACT

This study reports the spatio-temporal changes in river and canal water quality of peat swamp forest and oil palm plantation sites of Sarawak, Malaysia. To investigate temporal changes, 192 water samples were collected at four stations of BatangIgan, an oil palm plantation site of Sarawak, during July-November in 2009 and April-July in 2010. Nine water quality parameters including Electrical Conductivity (EC), pH, Turbidity (TER), Dissolved Oxygen (DO), Temperature (TEMP), Chemical Oxygen Demand (COD), five-day Biochemical Oxygen Demand (BOD5), ammonia-Nitrogen (NH3-N), Total Suspended Solids (TSS) were analysed. To investigate spatial changes, 432 water samples were collected from six different sites including BatangIgan during June-August 2010. Six water quality parameters including pH, DO, COD, BOD5, NH3-N and TSS were analysed to see the spatial variations. Most significant parameters which contributed in spatio-temporal variations were assessed by statistical techniques such as Hierarchical Agglomerative Cluster Analysis (HACA), Factor Analysis/Principal Components Analysis (FA/PCA) and Discriminant Function Analysis (DFA). HACA identified three different classes of sites: Relatively Unimpaired, Impaired and Less Impaired Regions on the basis of similarity among different physicochemical characteristics and pollutant level between the sampling sites. DFA produced the best results for identification of main variables for temporal analysis and separated parameters (EC, TER, COD) and identified three parameters for spatial analysis (pH, NH3-N and BOD5). The results signify that parameters identified by statistical analyses were responsible for water quality change and suggest the possibility the agricultural and oil palm plantation activities as a source of pollutants. The results suggest dire need for proper watershed management measures to restore the water quality of this tributary for a healthy and promising terrestrial and aquatic ecosystem.

Keyword: Water quality; Multivariate analysis; Oil palm plantation; Peat swamp forest; Malaysia