



## Environmental forensic study: tracing of pollution sources using environmetric technique in Balok and Tunggak Rivers near Gebeng industrial area, Kuantan, Pahang, Malaysia

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### ABSTRACT

Extensive deterioration of water quality caused by the intensive land use activities in rivers and rapid response of pollutants from different sources may harm the aquatic organisms, humans, and the environment. The water quality of the Balok River is believed has been deteriorated by anthropogenic impact as a result of the industrial activities in the Gebeng industrial area. This alarming occurrence has initiated this study to investigate the main sources of pollution in two rivers near the Gebeng industrial zone. Data collection was done from two rivers namely Balok and Tunggak Rivers from 2018–2019 near Gebeng industrial area. The physicochemical parameters measured in this study were temperature, specific conductivity, pH, turbidity, dissolved oxygen, and salinity. The water samples were collected for tracing the radioactive elements and heavy metals by using inductively coupled plasma-mass spectrometry (ICP–MS). Then, the data were compared and analyzed by using environmetric analysis (cluster analysis and principal component analysis) based on the sampling site and source point. The finding from the environmetric analysis showed that the main pollutants loading in Balok and Tunggak River were Lead (first component), specific conductivity (second component), Thorium (third component), and pH (fourth component). It can be concluded that the presence of the pollutants in these two rivers were originated from both point and non-point sources which could be disquieting for the sustainable development of fisheries resources in the near future.

*Keywords:* Sources of pollution; Rivers; Environmetric analysis; Balok; Tunggak River

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