

Hybrid off-river augmentation system as an alternative raw water resource: the hydrogeochemistry of abandoned mining ponds

ABSTRACT

The use of water from abandoned mining ponds under a hybrid off-river augmentation system (HORAS) has been initiated as an alternative water resource for raw water. However, it raises the questions over the safety of the use of such waters. In this study, the hydrogeochemical analysis of the waters is presented to assess the degree to which the water has been contaminated. Comparisons were made between sampling sites, i.e. abandoned mining ponds, active sand mining ponds and the receiving streams within Bestari Jaya, Selangor River basin. The aqueous geochemistry analysis showed different hydrochemical signatures of major elements between sites, indicating different sources of minerals in the water. Discharges from the sand mining ponds were found to contain elevated availability of dissolved concentrations of iron, manganese, lead, copper and zinc, among others. However, the quality of the water (from the main river) that is supplied for potable water consumption is at a satisfactory level despite being partly sourced from the abandoned mining ponds. In fact, all the metal concentrations detected were well below the Malaysia Ministry of Health guideline limits for untreated raw water. In addition, the results of the geochemical index analysis (i.e. geoaccumulation index, enrichment factor and modified contamination factor) showed that the rivers and abandoned mining ponds were generally unpolluted with respect to the metals found in sediments.

Keyword: Abandoned mine; Geochemical index; Heavy metals; HORAS; Hydrogeochemistry; Water supply