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Physico-chemical Characteristics and Heavy Metal Contents in Shallow Groundwater of Semarang Coastal Region

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Abstrak

Kandungan logam berat di dalam lingkungan perairan secara alami berasal dari hasil proses geokimia. Namun, kandungan logam berat dalam perairan ini dapat meningkat seiring dengan meningkatnya aktivitas manusia seperti, aktivitas pelayaran, limbah industri, limbah domesik, dan sebagainya. Dalam penelitian ini telah dilakukan pengukuran kandungan logam berat merkuri (Hg), timbal (Pb), besi (Fe), Kromium (Cr) dan tembaga (Cu) dari air sumur di wilayah Semarang Utara. Parameter fisika-kimia contoh air dan kandungan logam berat sampel air yang berasal dari daerah pantai Semarang juga diukur dengan menggunakan Atomic Absorption Spectrophotometer (AAS). Hasil penelitian menunjukkan bahwa nilai keragaman antar parameter fisika kimia (pH, suhu, salinitas) adalah kecil. Kandungan logam berat (mg L^{-1}) dalam sampel air menunjukkan nilai Cr 5.083 ± 1.59, Pb 5.52 ± 1.34, Fe 1.199 ± 1.29. Sedangkan logam Hg dan Cu dalam penelitian ini tidak terdeteksi. Nilai rerata hasil penelitian tersebut melebihi ambang maksimum yang disyaratkan World Health Organization (WHO) dan Indonesian Drinking & Domestic Water Quality Standard for Ground Water. Penelitian ini menunjukkan bukti adanya kontaminasi logam berat yang membahayakan pada suplai airtanah dangkal di daerah pantai Semarang.

Kata kunci: *parameter fisika kimia, logam berat, Atomic Absorption Spectrophotometer*

Abstract

Heavy metals in the aquatic environment have to date come mainly from naturally occurring geochemical materials. However, this has been enhanced by human activities such as shipping activity, industrial effluents, domestic sewage etc. An attempt was made to determine the level of trace metals such as Mercury (Hg), Lead (Pb), Iron (Fe), Chromium (Cr) and Copper (Cu) in shallow ground water at Semarang coastal region. The physico-chemical and trace metal contents of water samples from coastal zone of Semarang were assessed using Atomic Absorption Spectrophotometer technique. Results indicated that low variation existed among some physico-chemical parameter (pH, temperature, salinity). Heavy metal levels (mg L^{-1}) in the water were Cr 5.083 ± 1.59, Pb 5.52 ± 1.34, Fe 1.199 ± 1.29. However, Hg and Cu were not detected in any of the samples. Comparison of the metal contents in the water sample with World Health Organization (WHO) limits and Indonesian Drinking & Domestic Water Quality Standard for Ground Water showed that the mean levels of Fe, Pb, Cr were exceeded the maximum permissible levels for drinking water. This work has conclusively proven the presence of dangerous heavy metal contamination of the groundwater supply in the coastal area of Semarang.

Key words: *Physico-chemical parameters, heavy metals, Atomic Absorption Spectrophotometer*

Introduction

Fresh water resources are one of the most important resources for life on earth. As a result suitable water supply in terms of quality and quantity is of vey importance. From the point of view of ocean science, the coastal zone can be considered as the geographic space of interaction between terrestrial and marine ecosystems that is of great importance

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