ANALISIS KORELASI DAN VARIASI SPASIAL KONSENTRASI LOGAM BESI (Fe) DAN MANGAN (Mn) DALAM AIR DAN SEDIMEN SUNGAI BATANG KURANJI, PADANG, SUMATRA BARAT

TUGAS AKHIR

Sebagai salah satu syarat untuk menyelesaikan
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ABSTRAK

Beragamnya aktivitas manusia di sepanjang Sungai Batang Kuranji berpotensi mengakibatkan pencemaran di sungai tersebut. Penelitian ini bertujuan untuk menganalisis korelasi dan variasi spasial konsentrasi logam besi (Fe) dan mangan (Mn) dalam air dan sedimen sungai. Sampling dilakukan tiga kali selama enam minggu pada periode Februari-Maret 2025, dengan interval dua minggu di 8 titik sepanjang sungai dan 4 titik sumber pencemar. Hasil menunjukkan bahwa konsentrasi rata-rata Fe dan Mn dalam air berkisar antara 0,066–0,337 mg/L dan 0,022–0,105 mg/L. Konsentrasi Fe dalam air pada titik A5-A7 dan Mn dalam air pada titik A7 tidak memenuhi baku mutu kelas 1 berdasarkan PP No. 22 Tahun 2021 Lampiran VI. Konsentrasi Fe dan Mn dalam sedimen masing-masing sebesar 64,613–66,780 mg/kg dan 56,715–63,726 mg/kg. Pada sumber pencemar, konsentrasi Fe dan Mn tercatat antara 0,575–1,554 mg/L dan 0,042–0,170 mg/L. Dari hasil analisis korelasi rank spearman didapatkan konsentrasi Fe dan Mn dalam air dan sedimen menunjukkan korelasi sangat kuat dan positif (r = 0,976 dan r = 1,000). Keduanya memiliki hubungan yang kuat dan sangat kuat dengan parameter lingkungan, di mana Fe dan Mn berkorelasi negatif dengan DO (r = -0,762 dan r = -0,929) serta positif dengan temperatur (r = 0,762 dan r = 0,929). Pada sedimen, konsentrasi Fe dan Mn juga berkorelasi sangat kuat dan negatif terhadap pH (r = -0,886 dan r = -0,958). Namun antara konsentrasi Fe dan Mn dengan pH dalam air dan debit dalam air dan sedimen tidak terdapat korelasi yang signifikan. Analisis spasial menggunakan one-way ANOVA (α = 0,05) menunjukkan terdapat perbedaan signifikan konsentrasi logam Fe dan Mn di bagian hulu, tengah, dan hilir, mencerminkan pengaruh lokasi, aktivitas manusia, dan penggunaan lahan di sepanjang sungai. Hasil penelitian diharapkan dapat menjadi pedoman dalam program pemantauan kualitas Sungai Batang Kuranji selanjutnya.

***Kata kunci**: Besi, Mangan, korelasi, Sungai Batang Kuranji, variasi spasial.*

ABSTRACT

The variety of human activities along the Batang Kuranji River has the potential to cause pollution in the river. This study aims to analyze the correlation and spatial variation of iron (Fe) and manganese (Mn) metal concentrations in river water and sediments. Sampling was conducted three times over six weeks during the period of February-March 2025, with two-week intervals at 8 points along the river and 4 pollution source points. The results showed that the average concentration of Fe and Mn in water ranged from 0.066–0.337 mg/L and 0.022–0.105 mg/L. The concentration of Fe in water at points A5-A7 and Mn in water at point A7 did not meet the quality standards of class 1 based on Government Regulation Number 22 of 2021 Appendix VI. The concentrations of Fe and Mn in sediments were 64.613–66.780 mg/kg and 56.715–63.726 mg/kg, respectively. In pollutant sources, the concentrations of Fe and Mn were recorded between 0.575–1.554 mg/L and 0.042–0.170 mg/L. From the results of the spearman rank correlation analysis, it was found that the concentrations of Fe and Mn in water and sediment showed a very strong and positive correlation (r = 0.976 and r = 1.000). Both have a strong and very strong relationship with environmental parameters, where Fe and Mn are negatively correlated with DO (r = -0.762 and r = -0.929) as well as positively with temperature (r = 0.762 and r = 0.929). In sediments, the concentrations of Fe and Mn were also strongly correlated and negatively correlated with pH (r = -0.886 and r = -0.958). However, between the concentrations of Fe and Mn and pH in water and discharge in water and sediment there was no significant correlation. Spatial analysis using one-way ANOVA (α = 0.05) showed that there were significant differences in the concentrations of Fe and Mn metals in the upstream, middle, and downstream parts, reflecting the influence of location, human activity, and land use along the river. The results of the research are expected to be a guideline in the next Batang Kuranji River quality monitoring program.

***Keywords**: Batang Kuranji River, correlation analysis, Iron, Manganese, spatial variation.*