

INTISARI

Basin Wonosari dan Zona Peralihan Karst Gunungsewu secara hidrogeologis memiliki sumberdaya airtanah yang melimpah, namun di sisi lain memiliki potensi kerentanan terhadap pencemaran. Basin Wonosari dan Zona Peralihan Karst Gunungsewu memerlukan perlindungan dan pengelolaan airtanah secara berkelanjutan, salah satunya dengan kajian kerentanan airtanah terhadap pencemaran. Tujuan penelitian ini adalah untuk mengetahui distribusi spasial variabel kerentanan airtanah dan distribusi Kelas kerentanan airtanah di area kajian. Metode yang digunakan untuk mengukur Kelas kerentanan airtanah adalah metode COP modifikasi, yang terdiri dari variabel *Concentration of Flow* (C), *Overlaying Layer* (O) dan *Precipitation* (P). Parameter C (*Concentration of Flow*) terdiri dari pengurangan perlindungan (*reduction of protection*) sangat rendah, rendah, tinggi, dan sangat tinggi. Pengurangan perlindungan (*reduction of protection*) sedang, tinggi dan sangat tinggi terkonsentrasi di Zona Peralihan Karst Gunungsewu, khususnya di daerah imbuhan ponor. Parameter O (*Overlaying Layer*) terdiri dari tingkat perlindungan (*protection value*) sedang, tinggi, dan sangat tinggi. Tingkat perlindungan (*protection value*) sedang terkonsentrasi di Basin Wonosari bagian Barat. Parameter P (*Precipitation*) terdiri dari pengurangan perlindungan (*reduction of protection*) sedang, tinggi, dan sangat tinggi. Pengurangan perlindungan (*reduction of protection*) sangat tinggi di Basin Wonosari dan Zona Peralihan Karst Gunungsewu memiliki persentase yang hampir sama. Berdasarkan hasil *overlay*, kelas kerentanan airtanah terhadap pencemaran terdiri dari kelas kerentanan sangat rendah hingga sangat tinggi. Kerentanan airtanah di lokasi kajian didominasi oleh kelas kerentanan sedang. Kerentanan airtanah sedang di Basin Wonosari dan Zona Peralihan Karst Gunungsewu memiliki persentase yang hampir sama. Kerentanan rendah terkonsentrasi di Basin Wonosari, sedangkan kerentanan rendah terdistribusi hampir merata di Basin Wonosari dan Zona Peralihan Karst Gunungsewu. Kerentanan tinggi dan sangat tinggi di Zona Peralihan Karst Gunungsewu memiliki persentase lebih besar. Kerentanan sangat tinggi terkonsentrasi di Zona Peralihan Karst Gunungsewu, khususnya di daerah imbuhan ponor yang memiliki luasan sempit, yaitu $< 1 \text{ km}^2$. Berdasarkan hasil uji laboratorium, terdapat 6 sampel yang memiliki konsentrasi Nitrat (NO_3^-) melebihi baku mutu (10 mg/l). Hasil validasi dengan korelasi pearson menunjukkan nilai $r = 0,019$ (dapat diabaikan) saat semua data dipertahankan dan nilai $r = -0,47$ (korelasi rendah) saat 2 data anomali dihilangkan.

Kata Kunci : Kerentanan Airtanah, Pencemaran, COP, Basin Wonosari, Zona Peralihan Karst Gunungsewu, Nitrat

ABSTRACT

The Wonosari Basin and the Gunungsewu Karst Transition Zone have enormous groundwater resources but are vulnerable to contamination hydrogeologically. To achieve sustainable groundwater protection and management, it is crucial to study the vulnerability comprehensively. The research set out to determine the spatial distribution of groundwater vulnerability variables and levels in both areas. COP method, which integrates concentration of flow (C), overlaying layer (O), and precipitation (P), was used to measure the degree of vulnerability. C (Concentration of Flow) consists of very low, low, high, and very high reduction of protection. C (Concentration of Flow) parameter consists of very low, low, high, and very high reduction of protections. Moderate, high and very high reduction of protection are concentrated in the Gunungsewu Karst Transition Zone, particularly in the ponor recharge area. O (Overlaying Layer) parameter consists of moderate, high, and very high protection value. The moderate protection value is concentrated in the West Wonosari Basin. P (Precipitation) parameter consists of medium, high, and very high reduction of protection. The percentage of very high reduction of protection in Wonosari Basin and Gunungsewu Karst Transition Zone area almost similar. Based on the overlay, the groundwater vulnerability consists of a very low to very high level of vulnerability. Groundwater vulnerability in the study area is dominated by a moderate vulnerability. Moderate groundwater vulnerability in the Wonosari Basin and the Gunungsewu Karst Transition Zone have almost the same percentage. Low vulnerability is concentrated in the Wonosari Basin, while low vulnerability is distributed almost evenly in the Wonosari Basin and the Gunungsewu Karst Transition Zone. High and very high vulnerabilities in the Gunungsewu Karst Transition Zone have a higher percentage. Very high vulnerability is concentrated in the Gunungsewu Karst Transition Zone, especially in the ponor recharge area which has a narrow area, which is $< 1 \text{ km}^2$. Based on the results of laboratory tests, there are 6 samples which have the concentrations of Nitrate (NO_3^-) exceeding the quality standard (10 mg/l). The results of using Pearson correlation show the value of $r = 0.019$ (negligible) as all data is retained and the value of $r = -0.47$ (low correlation) as 2 anomalous (outlier) data are removed.

Keyword : Groundwater Vulnerability, Contamination, COP, Wonosari Basin, Gunungsewu Karst Transition Zone, Nitrate