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ANALISIS KUALITAS AIRTANAH PADA AKUIFER BEBAS UNTUK KEPERLUAN AIR MINUM DI KAPANEWON GODEAN, KABUPATEN SLEMAN

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INTISARI

Pesatnya urbanisasi dan perubahan penggunaan lahan di Kapanewon Godean diduga meningkatkan tekanan pencemaran terhadap kualitas airtanah yang dimanfaatkan masyarakat untuk kebutuhan sehari-hari. Tujuan dari dilakukannya penelitian ini adalah untuk: (1) mengetahui kondisi kualitas airtanah pada akuifer bebas untuk keperluan air minum dan persebarannya di Kapanewon Godean berdasarkan standar mutu air kelas satu Pergub DIY No. 20/2008; (2) menganalisis kondisi kualitas airtanah di Kapanewon Godean berdasarkan metode penilaian *National Sanitation Foundation-Water Quality Index* (NSF-WQI); serta (3) mengetahui distribusi spasial kondisi kualitas airtanah di Kapanewon Godean berdasarkan metode penilaian *National Sanitation Foundation-Water Quality Index* (NSF-WQI).

Penelitian ini menggunakan metode deskriptif kuantitatif dengan data primer berupa kualitas airtanah di Kapanewon Godean. Pengambilan sampel dilakukan menggunakan *systematic random sampling* berbasis grid terhadap 41 sumur gali, lalu dipilih 15 titik sampel menggunakan *stratified random sampling* berdasarkan kelas DHL. Kualitas airtanah dianalisis berdasarkan baku mutu air minum dan metode NSF-WQI, sedangkan analisis spasial dilakukan menggunakan interpolasi *Inverse Distance Weighting* (IDW) dan tabulasi silang dengan kepadatan penduduk. Hubungan antarvariabel dianalisis menggunakan uji korelasi Spearman.

Hasil penelitian menunjukkan bahwa kualitas airtanah di Kapanewon Godean belum memenuhi persyaratan sebagai sumber air minum, terutama akibat tingginya kandungan *fecal coliform* dan beberapa titik yang melebihi baku mutu nitrat, total fosfat, TSS, BOD, serta DO. Secara spasial, wilayah tengah dan timur didominasi pencemaran domestik, sedangkan wilayah barat dipengaruhi pencemaran bahan organik. Hasil perhitungan NSF-WQI menunjukkan bahwa kualitas airtanah didominasi kategori sedang. Analisis korelasi Spearman menunjukkan bahwa total fosfat memiliki hubungan negatif paling kuat dan signifikan terhadap skor NSF-WQI. Sementara itu, kepadatan penduduk tidak menunjukkan hubungan yang signifikan terhadap kualitas airtanah sehingga variasi kualitas airtanah diduga lebih dipengaruhi oleh faktor hidrogeologi, sistem sanitasi, konstruksi sumur, dan aktivitas manusia di sekitar sumber airtanah.

Kata Kunci: Kualitas Air, NSF-WQI, Baku Mutu, Kapanewon Godean, Kepadatan Penduduk

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GROUNDWATER QUALITY ANALYSIS OF THE UNCONFINED AQUIFER FOR DRINKING WATER PURPOSES IN KAPANEWON GODEAN, SLEMAN REGENCY

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ABSTRACT

Rapid urbanization and land-use change in Kapanewon Godean are suspected to increase pollution pressure on groundwater quality used by local communities for daily needs. This study aims to: (1) identify the condition and spatial distribution of unconfined aquifer groundwater quality for drinking water purposes in Kapanewon Godean based on the Class I water quality standard of the Yogyakarta Special Region Governor Regulation (Pergub DIY) No. 20/2008; (2) analyze groundwater quality conditions in Kapanewon Godean using the National Sanitation Foundation-Water Quality Index (NSF-WQI) method; and (3) determine the spatial distribution of groundwater quality conditions in Kapanewon Godean based on the NSF-WQI assessment method.

This study employed a quantitative descriptive method using primary data on groundwater quality in Godean District. Sampling was conducted using grid-based systematic random sampling on 41 dug wells, followed by the selection of 15 sampling points through stratified random sampling based on electrical conductivity (EC) classes. Groundwater quality was evaluated based on drinking water quality standards and the National Sanitation Foundation Water Quality Index (NSF-WQI). Spatial analysis was performed using the Inverse Distance Weighting (IDW) interpolation method and cross-tabulation with population density, while relationships among variables were analyzed using Spearman's rank correlation test.

The results indicate that the groundwater quality in Godean District does not fully meet the requirements for drinking water, primarily due to high fecal coliform concentrations, as well as several sampling points exceeding the permissible limits for nitrate, total phosphate, TSS, BOD, and DO. Spatially, the central and eastern parts of the study area were predominantly affected by domestic pollution, whereas the western part was mainly influenced by organic pollution. The NSF-WQI assessment classified most groundwater samples as having medium water quality. Spearman's correlation analysis revealed that total phosphate had the strongest and statistically significant negative correlation with the NSF-WQI score. Meanwhile, population density showed no significant relationship with groundwater quality, suggesting that groundwater quality variations are more likely influenced by hydrogeological conditions, sanitation systems, well construction, and surrounding human activities.

Keywords: *Water Quality, NSF-WQI, Water Quality Standard, Kapanewon Godean, Population Density*