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Evaluasi Neraca Air dan Proyeksi Kecukupannya di Kalurahan Jepitu, Kapanewon Girisubo, Kabupaten Gunungkidul
Yulia Dwi Azizah, Ir. Muhammad Chrisna Satriagasa, S.Si., M.Sc., M.Ec.Dev., Ph.D.
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EVALUASI NERACA AIR DAN PROYEKSI KECUKUPANNYA DI KALURAHAN JEPITU, KAPANEWON GIRISUBO, KABUPATEN GUNUNGKIDUL

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INTISARI

Kalurahan Jepitu, Kapanewon Girisubo, Kabupaten Gunungkidul merupakan kawasan karst yang sebagian besar masyarakatnya bergantung pada sistem Pemanenan Air Hujan (PAH) sebagai sumber utama pemenuhan kebutuhan air. Karakteristik kawasan karst yang memiliki lapisan tanah tipis dan sistem aliran bawah permukaan menyebabkan ketersediaan air sangat dipengaruhi oleh kondisi hidrologi. Penelitian ini bertujuan menganalisis ketersediaan air, kebutuhan air masyarakat, proyeksi kecukupan air periode 2025–2045, serta pengaruh perubahan tutupan lahan terhadap ketahanan air di Kalurahan Jepitu.

Ketersediaan air dianalisis menggunakan metode neraca air Thornthwaite–Mather dan dikaitkan dengan pengaruh *El Niño–Southern Oscillation* (ENSO) serta *Indian Ocean Dipole* (IOD). Kebutuhan air diperoleh melalui survei terhadap 100 rumah tangga. Perubahan tutupan lahan dianalisis menggunakan citra Sentinel-2 *Surface Reflectance Harmonized* (COPERNICUS/S2_SR_HARMONIZED) yang diakses melalui *platform* Google Earth Engine dengan akurasi klasifikasi sebesar 87,95%. Proyeksi kecukupan air disusun berdasarkan data CMIP6 pada tiga skenario perubahan iklim.

Hasil penelitian menunjukkan bahwa Kalurahan Jepitu masih memiliki surplus air meteorologis secara tahunan, meskipun beberapa tahun mengalami defisit akibat variabilitas iklim dengan pengaruh IOD yang lebih kuat dibandingkan ENSO. Rata-rata kebutuhan air domestik mencapai sekitar 92 L/orang/hari. Meskipun potensi air hujan secara teoretis mencukupi, kapasitas tampungan PAH yang terbatas menyebabkan kebutuhan air belum terpenuhi sepanjang musim kemarau. Hingga tahun 2045, potensi air hujan diproyeksikan relatif stabil, sedangkan kebutuhan air terus meningkat sehingga surplus air cenderung menurun. Perubahan tutupan lahan juga berpotensi menurunkan fungsi hidrologi kawasan karst. Oleh karena itu, peningkatan ketahanan air perlu dilakukan melalui peningkatan kapasitas PAH, perlindungan kawasan resapan, dan penerapan *nature-based solutions* (NbS).

Kata Kunci: kawasan karst, ketahanan air, pemanenan air hujan, perubahan tutupan lahan, *nature-based solutions* (NbS).

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WATER BALANCE EVALUATION AND WATER SUFFICIENCY PROJECTION IN JEPITU VILLAGE, GIRISUBO SUBDISTRICT, GUNUNGKIDUL REGENCY

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ABSTRACT

Jepitu Village, Girisubo Subdistrict, Gunungkidul Regency, is a karst area where most residents depend on Rainwater Harvesting (RWH) systems as their primary water source. The karst landscape is characterized by shallow soils and subsurface drainage, making water availability highly dependent on hydrological conditions. This study aimed to analyze water availability, community water demand, projected water sufficiency for 2025–2045, and the influence of land cover change on water security in Jepitu Village.

Water availability was analyzed using the Thornthwaite–Mather water balance method and related to the El Niño–Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD). Water demand was determined through a survey of 100 households. Land cover change was analyzed using Sentinel-2 Surface Reflectance Harmonized (COPERNICUS/S2_SR_HARMONIZED) imagery accessed through Google Earth Engine, with an overall classification accuracy of 87.95%. Water sufficiency was projected using CMIP6 climate data under three climate change scenarios.

The results showed an annual meteorological water surplus, although several years experienced water deficits due to climate variability, with the IOD exerting a stronger influence than ENSO. Average domestic water demand was approximately 92 L/person/day. Although the theoretical rainwater harvesting potential was sufficient, limited RWH storage capacity prevented water demand from being fully met during the dry season. By 2045, rainwater harvesting potential is projected to remain relatively stable, while water demand continues to increase, reducing the water surplus. Land cover change may also reduce the hydrological function of the karst area. Therefore, improving water security requires increasing RWH storage capacity, protecting groundwater recharge areas, and implementing nature-based solutions (NbS).

Keywords: karst landscape, water security, rainwater harvesting, land cover change, nature-based solutions (NbS).

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