

**ANALISIS DAYA DUKUNG LINGKUNGAN HIDUP BERBASIS  
JASA EKOSISTEM PENYEDIAAN AIR BERSIH DI DAS SERANG**

**KABUPATEN KULON PROGO**

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**INTISARI**

Daerah Aliran Sungai Serang merupakan bagian dari Kabupaten Kulon Progo yang seluruh wilayahnya berada dalam batas administrasi tersebut. Penelitian ini bertujuan untuk mengestimasi ketersediaan air permukaan dan air tanah, mengkalkulasi kebutuhan air domestik dan non domestik, serta menganalisis status daya dukung lingkungan hidup berbasis jasa ekosistem penyediaan air bersih berdasarkan perbandingan antara ketersediaan dan kebutuhan air bersih di DAS Serang. Pengolahan ketersediaan air dilakukan berdasarkan pembagian ekoregion melalui perhitungan air permukaan dan air tanah menggunakan metode Thornthwaite–Mather. Kebutuhan air domestik dihitung menggunakan Google Earth Engine, sedangkan kebutuhan sektor pertanian, industri, dan peternakan mengacu pada Standar Nasional Indonesia (SNI). Status daya dukung lingkungan ditentukan melalui perbandingan antara total ketersediaan dan kebutuhan air. Hasil penelitian menunjukkan bahwa total ketersediaan air permukaan di DAS Serang mencapai 281.735.825,48 m<sup>3</sup>, sedangkan ketersediaan air tanah sebesar 54.249.976,97 m<sup>3</sup>. Total kebutuhan air domestik adalah 9.265.364,40 m<sup>3</sup>, sementara kebutuhan non-domestik meliputi sektor pertanian 5.836.975,66 m<sup>3</sup>, industri 2.200.656,88 m<sup>3</sup>, dan peternakan 716.000,38 m<sup>3</sup>, sehingga total kebutuhan air mencapai 18.018.997,32 m<sup>3</sup>. Berdasarkan hasil analisis, status daya dukung lingkungan berbasis jasa ekosistem penyediaan air bersih di DAS Serang menunjukkan kondisi surplus pada hampir seluruh ekoregion, kecuali pada ekoregion Pegunungan Denudasional Formasi Jonggrangan di Kecamatan Girimulyo yang mengalami defisit. Hal ini menunjukkan bahwa secara umum DAS Serang masih berada dalam kondisi daya dukung lingkungan yang aman dan mampu menopang berbagai aktivitas penduduk serta kegiatan ekonomi di wilayahnya.

**Kata kunci:** daya dukung lingkungan, ketersediaan air, kebutuhan air, air bersih, DAS Serang

**ANALYSIS OF ENVIRONMENTAL CARRYING CAPACITY BASED ON  
ECOSYSTEM SERVICES FOR CLEAN WATER SUPPLY IN WATERSHED  
SERANG KULON PROGO REGENCY**

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**ABSTRACT**

*The Serang Watershed is a part of Kulon Progo Regency, with its entire area located within the administrative boundaries of the region. This study aims to estimate the availability of surface water and groundwater, calculate domestic and non-domestic water demand, and analyze the environmental carrying capacity based on ecosystem services for clean water provision by comparing the availability and demand for clean water in the Serang Watershed. Water availability was assessed through the delineation of ecoregions and the calculation of surface water and groundwater using the Thornthwaite–Mather method. Domestic water demand was estimated using Google Earth Engine, while water demand for the agricultural, industrial, and livestock sectors followed the guidelines of the Indonesian National Standard (SNI). The environmental carrying capacity status was determined by comparing total water availability with total water demand. The results show that total surface water availability in the Serang Watershed reaches 281,735,825.48 m<sup>3</sup>, while groundwater availability amounts to 54,249,976.97 m<sup>3</sup>. Total domestic water demand is 9,265,364.40 m<sup>3</sup>, and non-domestic demand consists of 5,836,975.66 m<sup>3</sup> for agriculture, 2,200,656.88 m<sup>3</sup> for industry, and 716,000.38 m<sup>3</sup> for livestock, resulting in a total water demand of 18,018,997.32 m<sup>3</sup>. Based on the analysis, the environmental carrying capacity related to clean water provision shows a surplus in almost all ecoregions, except for the Denudational Mountain Ecoregion of the Jonggrangan Formation in Girimulyo District, which experiences a deficit. These findings indicate that, overall, the Serang Watershed remains within a safe environmental carrying capacity condition and is capable of supporting various population activities and economic sectors within the region.*

**Keywords:** *environmental carrying capacity, water availability, water demand, clean water, Serang Watershed*