

IMPLIKASI PERUBAHAN PENGGUNAAN LAHAN TERHADAP NERACA AIR DAN INDEKS KEKERINGAN DI SUB DAS SAMIN

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INTISARI

Sub DAS Samin merupakan bagian dari DAS Bengawan Solo yang setiap tahunnya mengalami bencana kekeringan. Wilayah hulu Sub DAS ini berada di Kabupaten Karangnyar, sedangkan bagian hilirnya di Kabupaten Sukoharjo. Kekeringan diduga disebabkan oleh ketidakseimbangan neraca air akibat perubahan penggunaan lahan. Penelitian ini bertujuan untuk mengidentifikasi perubahan penggunaan lahan tahun 2019 dan 2024, menganalisis kondisi neraca air dan indeks kekeringan, serta keterkaitannya terhadap perubahan penggunaan lahan.

Data primer diperoleh melalui pengambilan sampel tanah dengan metode *stratified random sampling* pada empat jenis tanah dan enam jenis penggunaan lahan. Analisis tekstur tanah dilakukan menggunakan metode pipet untuk mengetahui proporsi fraksi pasir, lempung, dan debu. Data sekunder berupa curah hujan, suhu, dan lama penyinaran matahari tahun 2019 dan 2024 diperoleh dari BBWS Bengawan Solo. Neraca air dihitung menggunakan metode *thornthwaite-mather*, sedangkan perubahan penggunaan lahan dianalisis berdasarkan selisih luas antara tahun 2024 dan 2019.

Hasil penelitian menunjukkan terjadinya perubahan penggunaan lahan, dengan dominasi permukiman dan peningkatan terbesar pada tanah terbuka. Neraca air mengalami defisit air dan indeks kekeringan meningkat pada tahun 2024, terutama pada lahan kedap air dan bervegetasi rendah. Alternatif penanganan yang disarankan meliputi pelestarian kawasan hulu dan tanah terbuka, pengembangan sistem *agroforestry*, penghijauan di kawasan permukiman permukiman, adanya langkah antisipatif di musim kemarau, dan pembangunan infrastruktur konservasi air.

Kata Kunci: *Thornthwaite-Mather*, tanah terbuka, *stratified random sampling*, tekstur tanah, *agroforestry*

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IMPLICATIONS OF LAND USE CHANGE ON WATER BALANCE AND DROUGHT INDEX IN THE SAMIN SUB-WATERSHED

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ABSTRACT

The Samin Sub-watershed is part of the Bengawan Solo Watershed, which experiences drought disasters every year. The upstream area is located in Karanganyar Regency, while the downstream area lies in Sukoharjo Regency. The drought is suspected to be caused by an imbalance in the water balance due to land use changes. This study aims to identify land use changes between 2019 and 2024, analyze the water balance and drought index conditions, and examine their relationship with land use changes.

Primary data were obtained through soil sampling using the stratified random sampling method on four soil types and six land use types. Soil samples texture were analyzed using the pipette method to determine the proportion of sand, silt, and clay fractions. Secondary data, such as rainfall, temperature, and sunlight duration for 2019 and 2024, were obtained from BBWS Bengawan Solo. The water balance was calculated using the thornwaiter-mather method, while land use changes were analyzed based on the difference in land area between 2019 and 2024.

The results showed that land use in the Samin sub-watershed has changed, with settlement areas being dominant and open land showing the largest increase. The water balance deficit and drought index worsened in areas where impervious surfaces expanded and vegetated cover decreased. Recommended mitigation strategies include conserving upstream forests and open land areas, applying agroforestry system, urban greening, antisipatory measures during the dry season, and the construction of water infrastructure.

Keywords: *Thornthwaite-Mather, open land, stratified random sampling, soil texture, agroforestry*

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