

PENGEMBANGAN *NATURE-BASED SOLUTIONS* SECARA SPASIO-
TEMPORAL DALAM KONTEKS *URBAN STORMWATER MANAGEMENT* DI
KALURAHAN SARIHARJO

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INTISARI

Urbanisasi yang tak terhindarkan telah mengubah wajah wilayah pinggiran kota seperti Kalurahan Sariharjo, mengikis ruang hijau, dan memperbesar potensi limpasan air hujan. Dalam menghadapi risiko yang semakin nyata ini, solusi berbasis alam (*Nature-based Solutions/NbS*) ada untuk mengembalikan keseimbangan ekosistem bagi lingkungan dan masyarakat Sariharjo. Isu tersebut melatarbelakangi tujuan penelitian ini, yaitu untuk: (1) Menganalisis perubahan tutupan lahan dan kaitannya dengan potensi limpasan permukaan; (2) Memetakan rekomendasi lokasi praktik NbS secara konseptual dalam konteks *urban stormwater management* berdasarkan karakteristik fisik geografisnya; dan (3) Mengetahui distribusi spasial dan kontinuitas temporal praktik NbS eksistingnya. Metode yang digunakan mencakup analisis perubahan tutupan lahan 2013–2023 melalui interpretasi citra satelit, pemodelan limpasan menggunakan metode Natural Resources Conservation Service—Curve Number (NRCS-CN), serta analisis Spatial Multi Criteria Evaluation (SMCE) untuk menentukan area target implementasi NbS. Selain itu, studi literatur, wawancara semi-terstruktur dengan informan kunci, dan observasi lapangan dilakukan untuk memahami kondisi praktik NbS yang ada di wilayah ini. Penelitian ini menyoroti urgensi penerapan NbS untuk pengelolaan air hujan badai di Kalurahan Sariharjo. Dari 2013 hingga 2023, lahan terbangun meningkat 0,92 km² (13,36%), sementara vegetasi dan rerumputan menyusut. Transformasi ini meningkatkan limpasan permukaan, terutama di wilayah tengah dan selatan yang lebih terbangun. Wilayah Sariharjo dibagi menjadi lima tipe area target NbS (Tipe A–E), dengan bagian selatan (Tipe E) membutuhkan intervensi seperti kolam detensi, sementara utara (Tipe A) lebih cocok untuk konservasi ekosistem. Saat ini, 70 titik NbS dengan 12 jenis, didominasi taman vertikal dan paving berpori, telah ditemukan di Sariharjo. Efektivitas NbS bergantung pada perawatan rutin dengan variasi kinerja yang lebih optimal saat musim hujan. NbS di Sariharjo menunjukkan potensi besar dalam mereduksi limpasan, tetapi membutuhkan kolaborasi dan kesadaran untuk keberlanjutan. Hasil penelitian ini diharapkan berkontribusi pada pengembangan NbS secara global dalam menghadapi urbanisasi dan perubahan iklim.

Kata kunci: Limpasan, *Nature-based Solutions*, Tutupan Lahan, Spasio-temporal, *Urban Stormwater Management*, Urbanisasi

NATURE-BASED SOLUTIONS IN A SPATIO-TEMPORAL MANNER FOR URBAN STORMWATER MANAGEMENT IN SARIHARJO VILLAGE

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ABSTRACT

The inevitable urbanization has transformed suburban areas like Kalurahan Sariharjo, eroding green spaces and increasing stormwater runoff potential. In addressing these growing risks, Nature-based Solutions (NbS) provide a means to restore ecological balance for the environment and communities in Sariharjo. This issue underpins the objectives of this research, which are: (1) To analyze land cover changes and their relationship with surface runoff potential; (2) To map conceptual recommendations for NbS practices in the context of urban stormwater management based on the area's geographical characteristics; and (3) To identify the spatial distribution and temporal continuity of existing NbS practices. The methods include analyzing land cover changes from 2013 to 2023 through satellite image interpretation, runoff modeling using the Natural Resources Conservation Service—Curve Number (NRCS-CN) method, and Spatial Multi-Criteria Evaluation (SMCE) analysis to identify target areas for NbS implementation. Additionally, literature reviews, semi-structured interviews with key informants, and field observations were conducted to understand the current state of NbS practices in the area. This study highlights the urgency of implementing NbS for stormwater management in Kalurahan Sariharjo. Between 2013 and 2023, built-up areas increased by 0.92 km² (13.36%), while vegetation and grasslands declined. These land transformations have amplified surface runoff, particularly in the more urbanized central and southern regions. Sariharjo is divided into five target NbS area types (Types A–E), with the southern area (Type E) requiring interventions such as detention ponds, while the northern area (Type A) is better suited for ecosystem conservation. Currently, 70 NbS points, representing 12 different types, have been identified in Sariharjo, dominated by vertical gardens and porous pavements. The effectiveness of NbS depends on regular maintenance, with performance varying and becoming more optimal during the rainy season. NbS in Sariharjo demonstrates significant potential to reduce runoff but requires collaboration and awareness to ensure sustainability. The findings of this research are expected to contribute to the global development of NbS in addressing urbanization and climate change challenges.

Keyword : Land Cover, Nature-based Solutions, Runoff, Spatio-temporal, Urban Stormwater Management, Urbanization