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Analisis Perubahan Konsentrasi Total Suspended Solid secara Multitemporal Menggunakan Citra Sentinel 2A (Studi Kasus: Danau Rawa Pening, Jawa Tengah)

ANALISIS PERUBAHAN KONSENTRASI TOTAL SUSPENDED SOLID SECARA MULTITEMPORAL MENGGUNAKAN CITRA SENTINEL 2A (STUDI KASUS: DANAU RAWA PENING, JAWA TENGAH)

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Abstract

Abstrak

Danau Rawa Pening merupakan danau alami yang termasuk danau prioritas utama untuk dilakukan restorasi karena pertumbuhan eceng gondok yang tinggi. Pertumbuhan eceng gondok menyebabkan tertutupnya permukaan air danau dan penumpukan sedimen di dasar perairan. Sedimentasi adalah salah satu faktor penyebab munculnya Total Suspended Solid (TSS) yang menggambarkan kualitas perairan. Pemantauan perubahan kualitas perairan dapat dilakukan dengan melakukan pemetaan menggunakan metode penginderaan jauh. Pada penelitian ini pemetaan TSS dilakukan guna mencari algoritma empiris yang sesuai dengan kondisi Danau Rawa Pening dan menganalisis sebaran konsentrasi TSS melalui algoritma yang didapat. Metode yang digunakan dalam analisis konsentrasi TSS adalah pembangunan model algoritma melalui regresi data reflektan Citra Sentinel 2A tahun 2021 band 1 – 8A yang memiliki kemungkinan tinggi dalam penyerapan dan hamburan balik dari objek air dengan data TSS in situ. Percobaan penerapan regresi dipakai jika nilai $\geq 0,5$ yang menunjukkan adanya hubungan keterkaitan yang kuat antara variabel TSS in situ dan nilai reflektans band. Hasil dari penelitian ini berupa 2 model dengan nilai $\geq 0,5$ yaitu model persamaan regresi berganda menggunakan ratio band, nilai sebesar 0,620 dan persamaan regresinya. Sebaran konsentrasi TSS di Danau Rawa Pening memenuhi kriteria baku mutu air dengan sebagian besar berada pada kelas I dan sebagian kecil berada kelas II, III, dan IV. Konsentrasi tertinggi

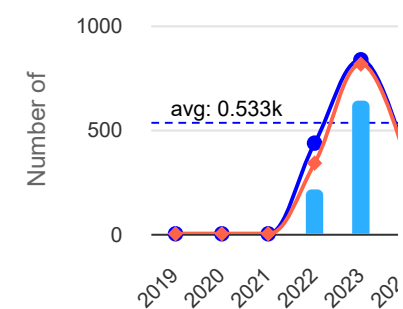
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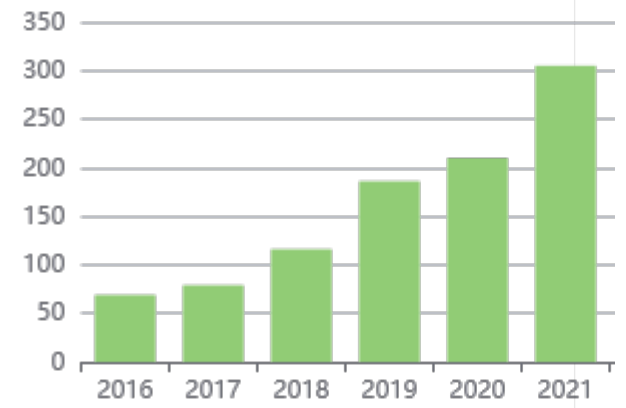
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
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Analisis Perubahan Konsentrasi *Total Suspended Solid* secara *Multitemporal* Menggunakan Citra Sentinel 2A (Studi Kasus: Danau Rawa Pening, Jawa Tengah)

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Abstrak

Danau Rawa Pening merupakan danau alami yang termasuk danau prioritas utama untuk dilakukan restorasi karena pertumbuhan eceng gondok yang tinggi. Pertumbuhan eceng gondok menyebabkan tertutupnya permukaan air danau dan penumpukan sedimen di dasar perairan. Sedimentasi adalah salah satu faktor penyebab munculnya Total Suspended Solid (TSS) yang menggambarkan kualitas perairan. Pemantauan perubahan kualitas perairan dapat dilakukan dengan melakukan pemetaan menggunakan metode penginderaan jauh. Pada penelitian ini pemetaan TSS dilakukan guna mencari algoritma empiris yang sesuai dengan kondisi Danau Rawa Pening dan menganalisis sebaran konsentrasi TSS melalui algoritma yang didapat. Metode yang digunakan dalam analisis konsentrasi TSS adalah pembangunan model algoritma melalui regresi data reflektan Citra Sentinel 2A tahun 2021 band 1 – 8A yang memiliki kemungkinan tinggi dalam penyerapan dan hamburan balik dari objek air dengan data TSS in situ. Percobaan penerapan regresi dipakai jika nilai $R^2 \geq 0,5$ yang menunjukkan adanya hubungan keterkaitan yang kuat antara variabel TSS in situ dan nilai reflektan band. Hasil dari penelitian ini berupa dua model dengan nilai $R^2 \geq 0,5$ yaitu model persamaan regresi berganda menggunakan ratio band 4/6, nilai R^2 sebesar 0,620 dan persamaan regresinya $TSS = -12,962 + 54,76 X_{(B\ 4/6)} - 54,891 [X_{(B\ 4/6)}]^2 + 17,918 [X_{(B\ 4/6)}]^3$. Sebaran konsentrasi TSS di Danau Rawa Pening memenuhi kriteria baku mutu air dengan sebagian besar berada pada kelas I dan sebagian kecil berada kelas II, III, dan IV. Konsentrasi tertinggi menggunakan perhitungan algoritma ratio band 4/6 pada tahun 2021 sebesar 0 – 258,91 mg/L dan terendah pada tahun 2020 sebesar 0 – 6,13 mg/L.

Kata kunci: citra sentinel 2A; danau Rawa Pening; model algoritma; TSS

Abstract

[Title: Analysis Concentration Changes of Multitemporal Total Suspended Solid Using Sentinel Image 2A] Rawa Pening Lake is a natural lake between Ambarawa, Tuntang, Bawen, and Banyubiru sub-districts, Semarang Regency, including a top priority lake that needs restoration due to the high growth of water hyacinth. The uncontrolled growth of water hyacinth causes the water surface to be covered, and the sediment increases at the bottom of the lake. Sedimentation is one of the factors causing the emergence of Total Suspended Solid (TSS), which describes the water quality. Monitoring changes in water quality can be done by mapping using remote sensing methods. In this study, TSS mapping was carried out to find an empirical algorithm suitable for the conditions of Rawa Pening Lake and to analyze the distribution of TSS concentrations through the obtained algorithm. The method used in the analysis of the TSS concentration is the development of an algorithm model through the regression of the reflectance data of Sentinel Image 2A in 2021 bands 1 – 8A, which has a high probability of absorption and backscattering of water objects with in-situ TSS data. The regression application experiment was used if the value of $\geq 0,5$ indicated a strong correlation between the in situ TSS variable and the reflectance band value. The results of this study are 2 models with a value of $\geq 0,5$, the 3rd order polynomial regression equation model uses a band ratio of 4/6, the value of is 0,620, and the regression equation is . The distribution of TSS

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