

Analisis spasial perubahan kualitas air permukaan danau akibat keberadaan solar panel terapung = Spatial analysis of changes in lake surface water quality due to the existence of floating solar panel

Chelsa Debora, author

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Abstrak

Penutupan solar panel terapung yang membatasi sinar matahari terhadap air permukaan danau disertai dengan limpasan air limbah domestik menuju danau mempengaruhi kelangsungan hidup fitoplankton dan eutrofikasi. Penelitian ini bertujuan untuk menganalisis pola distribusi spasial perubahan klorofil-a, nitrat, amonia, dan fosfat serta hubungan klorofil-a terhadap ketiga parameter nutrisi tersebut pada air permukaan danau akibat keberadaan Solar Panel Terapung (SPT). Sebanyak 28 sampel air dikumpulkan dari 7 titik pengambilan selama 4 minggu musim hujan pada kedalaman kurang lebih 30 cm dari permukaan air di Danau Mahoni Universitas Indonesia, Depok. Titik-titik ini memetakan 4 parameter, yaitu klorofil-a, nitrat, amonia, dan fosfat. Tinjauan terhadap dinamika perubahan parameter, analisis spasial, dan statistik inferensial dilakukan.

Uji Kruskal-Wallis menunjukkan penutupan SPT tidak berpengaruh signifikan pada perubahan konsentrasi klorofil-a, nitrat, amonia, dan fosfat. Analisis spasial menghasilkan pola klorofil-a dan fosfat yang sama, yaitu tinggi pada hulu, dan semakin menurun pada zona tengah danau dan SPT, kemudian meningkat di bagian hilir. Pola sebaran nitrat yang sedang pada hulu, dan semakin rendah pada zona tengah danau dan SPT, meningkat di bagian tengah ketiga, kemudian rendah di bagian hilir. Pola sebaran amonia berbanding terbalik dengan pola sebaran nitrat. Analisis regresi menunjukkan klorofil-a terhadap masing-masing nutrisi pada keadaan terbuka lebih lemah terhadap hubungan korelasi pada keadaan tertutup. Analisis korelasi menunjukkan bahwa parameter korelasi klorofil-a terhadap ketiga nutrisi pada SPT lebih lemah dibandingkan titik lainnya yang berada dalam keadaan terbuka.

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Covering of floating solar panels that limit sunlight to the lake surface water accompanied by domestic wastewater flow to the lake affects the life of phytoplankton and eutrophication. This study aims to analyze the spatial distribution patterns of changes in chlorophyll-a, nitrate, ammonia, and phosphate as well as the relationship of chlorophyll-a to the three nutrient parameters in lake surface water due to the presence of a floating solar panel. A total of 28 water samples were collected from 7 sampling points during 4 weeks of rainy season at a depth of approximately 30 cm from the surface water in Mahoni Lake, Universitas Indonesia, Depok. These points plot 4 parameters, namely chlorophyll-a, nitrate, ammonia, and phosphate. A review of changes in parameter dynamics, spatial analysis, and inferential statistics were carried out. Kruskal-Wallis test shows that floating solar panel covering has no significant effect on changes in the concentration of chlorophyll-a, nitrate, ammonia, and phosphate. Spatial analysis results in the same pattern of chlorophyll-a and phosphate, which was high in the upstream, and decreased in the middle zone of the lake and floating solar panels, then increased in the downstream. The pattern of nitrate distribution is moderate in the upstream, and lower in the middle zone of the lake and floating solar panels, increasing in the third middle, then lower in the downstream. The distribution pattern of ammonia is inversely proportional to the distribution pattern of nitrate. Regression analysis shows that chlorophyll-a correlation

for each nutrient in the open water zone is weaker than the in the floating solar panel-covered zone. The correlation analysis shows that the correlation of parameter chlorophyll-a to nitrate, ammonia, and phosphate concentrations in the floating solar panel is weaker than the other points in the open water lake.