ABSTRAK

Fenomena *Harmfull Algae Blooms* (HABs) dapat mengakibatkan akumulasi toksin pada biota, penurunan kualitas air dan kerugian ekonomi. Penelitian ini bertujuan menganalisis korelasi variabel makronutrien (N dan P) terhadap kelimpahan fitoplankton penyebab HABs di tambak *silvofishery* Pantai Utara Jawa Tengah. Metode penelitian menggunakan survei eksploratif dengan pendekatan spasial (Kabupaten Brebes, Tegal, Pemalang, Pekalongan) dan temporal (empat musim selama 2022–2023). Data dianalisis menggunakan *Principal Component Analysis* (PCA) dan *Cluster Analysis* (CA). Hasil penelitian diperoleh konsentrasi N antara 0,54–4,39 ppm dan P antara 2,19–5,87 ppm. Identifikasi fitoplankton ditemukan 146 spesies, di mana empat divisi berpotensi HABs, yaitu *Cyanophyta*, *Chrysophyta*, *Miozoa*, dan *Pyrophyta*. Kelimpahan fitoplankton mencapai nilai maksimal yaitu 57.865,5 ind/L, jauh melampaui ambang batas kesuburan perairan. Analisis PCA dan CA dengan variasi keterkaitan makronutrien terhadap HABs didapat 90,94% secara spasial dan 86,60% secara temporal. Kondisi tersebut mengindikasikan bahwa fluktuasi nutrien dan perubahan musim secara signifikan memicu ledakan alga berbahaya di lokasi penelitian, yang berisiko bagi kesehatan ekosistem dan manusia.

Kata Kunci: Fitoplankton, HABs, Makronutrien, *Silvofishery, Spasial-Temporal*.

ABSTRACT

Harmful Algae Blooms (HABs) can cause toxin accumulation in biota, deterioration of water quality, and economic losses. This study aims to analyze the correlation between macronutrient variables (N and P) and the abundance of phytoplankton causing HABs in silvofishery ponds on the north coast of Central Java. The research method used an exploratory survey with a spatial approach (Brebes, Tegal, Pemalang, and Pekalongan districts) and a temporal approach (four seasons during 2022–2023). The data were analyzed using Principal Component Analysis (PCA) and Cluster Analysis (CA). The results showed N concentrations between 0.54–4.39 ppm and P between 2.19–5.87 ppm. A total of 146 phytoplankton species were identified, of which four divisions had the potential to cause HABs, namely Cyanophyta, Chrysophyta, Miozoa, and Pyrophyta. Phytoplankton abundance reached a maximum value of 57,865.5 ind/L, far exceeding the threshold for water fertility. PCA and CA analyses of the relationship between macronutrients and HABs showed 90.94% spatial and 86.60% temporal variation. These conditions indicate that nutrient fluctuations and seasonal changes significantly trigger harmful algal blooms at the study site, posing a risk to ecosystem and human health.

Key Words : HABs, Macronutrient, Phytoplankton, Silvofishery, Spasio-Temporal.