

ABSTRAK

Ekosistem mangrove di Segara Anakan, Cilacap, memiliki peran ekologis penting namun rentan terhadap pencemaran minyak akibat aktivitas antropogenik seperti perkapalan, industri, dan pelabuhan. Penelitian ini bertujuan untuk menganalisis hubungan antara kerapatan dan komposisi jenis mangrove dengan tingkat pencemaran *Total Petroleum Hydrocarbon* (TPH), berdasarkan pendekatan zonasi dan analisis klaster vegetasi. Penelitian dilakukan pada empat stasiun menggunakan metode purposive sampling. Data dikumpulkan melalui identifikasi jenis mangrove dan pengukuran kerapatan vegetasi, serta analisis laboratorium terhadap konsentrasi TPH pada substrat sedimen. Hasil penelitian menunjukkan bahwa stasiun dengan kerapatan mangrove tinggi, khususnya yang didominasi oleh *Rhizophora apiculata* (23-25%) dan *Avicennia marina* (21-22%), memiliki kadar TPH yang lebih rendah dibandingkan stasiun dengan vegetasi jarang. Di stasiun tertentu, dominasi spesies lain seperti *Ceriops tagal* (39%) dan *Rhizophora stylosa* (19-25%) juga terlihat signifikan terhadap kemampuan ekosistem dalam mereduksi polusi minyak. Zonasi ekologis menunjukkan fungsi berbeda tiap zona, di mana zona depan yang didominasi *Avicennia* sp. berperan sebagai penahan awal sebaran minyak, sedangkan zona tengah dan belakang yang didominasi oleh *Rhizophora* sp. dan *Bruguiera* sp. berfungsi sebagai penyaring lanjutan. Analisis klaster mengindikasikan adanya hubungan erat antara struktur vegetasi dan tingkat kerentanan terhadap pencemaran minyak. Temuan ini menegaskan pentingnya pengelolaan mangrove berbasis zonasi dan klasterisasi untuk mitigasi pencemaran minyak secara ekologis dan berkelanjutan.

Kata kunci: Mangrove, Total Petroleum Hydrocarbon (TPH), zonasi, klaster, kerapatan, Segara Anakan, pencemaran minyak.

ABSTRACT

The mangrove ecosystem in Segara Anakan, Cilacap, plays a vital ecological role but remains highly vulnerable to oil pollution due to increasing anthropogenic activities such as shipping, industrial operations, and port development. This study aims to analyze the relationship between mangrove density and species composition with Total Petroleum Hydrocarbon (TPH) contamination levels, using zonation and vegetation cluster approaches. The research was conducted at four observation stations selected purposively. Data were obtained through field measurements of mangrove species composition and density, along with laboratory analysis of TPH concentrations in sediment substrates. The results showed that stations with high mangrove density—particularly those dominated by *Rhizophora apiculata* (23-25%) and *Avicennia marina* (21-22%)-tended to have lower TPH concentrations compared to areas with sparse vegetation. In certain locations, other dominant species such as *Ceriops tagal* (39%) and *Rhizophora stylosa* (19-25%) also demonstrated a significant ecological role in limiting oil pollution. The zonation analysis revealed functional differentiation across zones: the front zone dominated by *Avicennia sp.* served as a primary barrier against oil dispersion, while the middle and landward zones dominated by *Rhizophora sp.* and *Bruguiera sp.* acted as secondary filters. Cluster analysis indicated a strong correlation between vegetation structure and vulnerability to pollution. These findings underscore the importance of zonation and cluster-based mangrove management strategies to support sustainable and ecological mitigation of oil pollution in coastal areas.

Keywords: Mangrove, Total Petroleum Hydrocarbon (TPH), zonation, cluster, density, Segara Anakan, oil pollution.