KAJIAN PENCEMARAN LINGKUNGAN AKIBAT MIKROPLASTIK DI TAMBAK UDANG WILAYAH PESISIR SAMAS KABUPATEN BANTUL DAERAH ISTIMEWA YOGYAKARTA

INTISARI

Mikroplastik merupakan salah satu pencemar lingkungan yang semakin mendapat perhatian karena pengaruhnya terhadap ekosistem, termasuk dalam sistem akuakultur. Penelitian ini dilakukan di tambak udang Pantai Samas, Daerah Istimewa Yogyakarta, yang berkembang sebagai sentra budidaya udang Litopenaeus vannamei. Aktivitas budidaya seperti penggunaan jaring, terpal, dan geomembran diduga menjadi sumber utama pencemaran mikroplastik. Penelitian ini bertujuan untuk: (1) identifikasi jumlah, jenis, warna, dan sumber mikroplastik; (2) analisis pengaruh pencemaran lingkungan akuakultur akibat mikroplastik; dan (3) perumusan strategi pengendalian pencemaran mikroplastik secara berkelanjutan. Metode penelitian mencakup analisis mikroskopik untuk mengamati bentuk, warna, dan jumlah partikel mikroplastik, serta analisis kimia menggunakan *Fourier Transform Infrared* (FTIR) untuk identifikasi jenis polimer. Strategi pengendalian dirumuskan melalui studi literatur dan pendekatan *Driving Forces–Pressures–State–Impacts–Responses* (DPSIR). Hasil pengujian menunjukkan bahwa mikroplastik dalam air tambak berkisar antara 200–380 partikel/L, sedangkan dalam tubuh udang mencapai 1–6 partikel/g. Jenis mikroplastik yang paling dominan adalah *fiber*, diikuti oleh *fragment*, *film*, pelet, dan *foam*. Analisis FTIR mengungkapkan bahwa sebagian besar partikel yang teridentifikasi merupakan bahan alami atau biopolimer berbasis selulosa, seperti *Tencel*, *Ramie*, dan *Cotton*. Pengaruh kontaminasi mikroplastik ini berpotensi mengancam keamanan pangan dan menurunkan daya saing produk budidaya udang, khususnya untuk pasar ekspor. Hal ini didukung dengan nilai *Pollution Load Index* (PLI) masuk ke dalam pencemaran ringan. Strategi pengendalian yang disusun meliputi: modernisasi sistem pengelolaan air dan limbah tambak, manajemen siklus hidup material plastik dari hulu ke hilir, serta penguatan regulasi, kapasitas kelembagaan, dan literasi petambak terhadap isu mikroplastik.

Kata Kunci: Mikroplastik, Tambak Udang, Mikroskop, FTIR, DPSIR

ENVIRONMENTAL POLLUTION ASSESSMENT DUE TO MICROPLASTICS IN SHRIMP PONDS OF THE SAMAS COASTAL AREA, BANTUL REGENCY, SPECIAL REGION OF YOGYAKARTA

ABSTRACT

Microplastics are emerging environmental pollutants that have garnered increasing attention due to their impacts on ecosystems, including within aquaculture systems. This study was conducted at shrimp ponds in the Samas coastal area, Yogyakarta Special Region, which has developed into a center for *Litopenaeus vannamei* shrimp farming. Aquaculture activities such as the use of nets, tarpaulins, and geomembranes are suspected to be the main sources of microplastic pollution. This research aims to: (1) identify the quantity, type, color, and sources of microplastics; (2) analyze the environmental impacts of microplastic contamination in aquaculture systems; and (3) formulate sustainable strategies for microplastic pollution control. The methodology includes microscopic analysis to observe the shape, color, and quantity of microplastic particles, as well as Fourier Transform Infrared (FTIR) spectroscopy to identify polymer types. Control strategies were developed through literature review and the Driving Forces–Pressures–State–Impacts–Responses (DPSIR) framework. Test results showed that microplastic concentrations in pond water ranged from 200–380 particles/L, while in shrimp tissue it reached 1–6 particles/g. The dominant microplastic type was fiber, followed by fragment, film, pellets, and foam. FTIR analysis revealed that most particles were natural materials or cellulose-based biopolymers such as Tencel, Ramie, and Cotton. The impact of microplastic contamination poses a potential threat to food safety and reduces the competitiveness of farmed shrimp products, particularly for export markets. This is supported by the Pollution Load Index (PLI), which falls within the low pollution category. The proposed control strategies include modernizing water and waste management systems, implementing lifecycle plastic management from upstream to downstream, and strengthening regulations, institutional capacity, and farmer literacy on microplastic issues.

Keywords: Microplastics, Shrimp Ponds, Microscope, FTIR, DPSIR