

INTISARI

Resiliensi merupakan kemampuan ekosistem untuk bertahan melalui resistensi yang kuat atau pulih dengan cepat pada spesies pembentuk habitat, dalam konteks ini adalah terumbu karang. Kemampuan ini bergantung pada distribusi kelompok fungsional lintas skala, yang menjadi kunci dalam menjaga stabilitas sistem. Penelitian ini bertujuan untuk (1) menganalisis struktur komunitas terumbu karang berdasarkan parameter biotik dan abiotik, (2) mengukur dan menginterpretasikan indeks resiliensi lintas stasiun, (3) menganalisis kondisi sosial masyarakat yang berhubungan dengan ekosistem karang, serta (4) mengevaluasi hubungan antarindikator guna menentukan indikator paling representatif dalam penilaian resiliensi. Survei dilakukan di empat stasiun: Mercusuar (MR) dan *Water Intake* (WI) sebagai kontrol, serta *Water Discharge* Barat (WDB) dan *Water Discharge* Timur (WDT) sebagai *hotspot*. Data biotik dikumpulkan di sepanjang garis transek sejauh 70 m melalui *Underwater Photo Transect* (UPT) untuk komunitas bentik, *Underwater Visual Census* untuk ikan herbivora, serta *belt transect* untuk makroinvertebrata herbivora. Data abiotik diperoleh dari pengukuran langsung maupun data sekunder. Aspek sosial dikaji melalui kuesioner Likert pada masyarakat pesisir. Hubungan dan seleksi indikator dianalisis menggunakan korelasi Spearman, koefisien variasi (CV), dan *Principal Component Analysis* (PCA), kemudian disusun indeks komposit untuk membandingkan resiliensi relatif antarstasiun. Hasil menunjukkan MR memiliki resiliensi relatif tertinggi (final=1,000; *high*) ditopang oleh fungsi herbivora yang kuat; diikuti WI (0,971; *medium-high*) dengan tutupan karang dan genus karang resisten tinggi. Stasiun *hotspot* lebih rendah, terutama WDT (0,315; *low*) dan WDB (0,763; *medium-low*), dicirikan pelemahan herbivori dan tekanan gangguan dan kompetisi yang lebih tinggi. Resiliensi sosial berada pada kisaran 0,76–0,86; dimensi penghidupan (B2) terendah, sedangkan kesehatan-budaya (B4) tertinggi, dan berpotensi mendukung tata kelola berbasis komunitas. Enam indikator utama yang direkomendasikan yaitu tutupan karang, rekrutmen karang, biomassa ikan herbivora, tutupan makroalga, suhu, dan TSS, dengan pendukung biomassa invertebrata herbivora serta prevalensi penyakit karang. Adapun stasiun WDT menjadi prioritas monitoring dan intervensi.

Kata kunci: resiliensi terumbu karang, stress termal, fungsi herbivori, gangguan kesehatan dan kompetisi, PLTU Paiton

ABSTRACT

Resilience refers to an ecosystem's capacity to persist through strong resistance or to recover rapidly, particularly in habitat-forming species such as coral reefs. This capacity depends on the distribution of functional groups across scales, which is critical for maintaining system stability. This study aimed to (1) analyze coral reef community structure based on biotic and abiotic parameters, (2) measure and interpret a cross-station resilience index, (3) assess coastal community social conditions linked to coral reef ecosystems, and (4) evaluate relationships among indicators to identify the most representative (non-redundant) indicators for resilience assessment. Surveys were conducted at four stations: Lighthouse (MR) and Water Intake (WI) as controls, and West Water Discharge (WDB) and East Water Discharge (WDT) as hotspots. Biotic data were collected along a 70 m transect using Underwater Photo Transect (UPT) for benthic communities, Underwater Visual Census (UVC) for herbivorous fishes, and belt transects for herbivorous macroinvertebrates. Abiotic data were obtained from direct measurements and secondary datasets. Social aspects were assessed using Likert-scale questionnaires administered to coastal communities. Indicator relationships and selection were analyzed using Spearman correlation, coefficient of variation (CV), and Principal Component Analysis (PCA), and a composite index was then compiled to compare relative resilience among stations. Results show that MR had the highest resilience ($final=1.000$; high), supported by strong herbivory. It was followed by WI (0.971; medium-high), with high coral cover and resistant coral genera. Hotspot stations were lower, particularly WDT (0.315; low) and WDB (0.673; medium-low), characterized by weakened herbivory and higher disturbance/competition pressure. Social resilience ranged from 0.76 to 0.86; livelihoods (B2) scored lowest, while health-culture (B4) scored highest and may support community-based governance. Six core indicators are recommended for monitoring: coral cover, coral recruitment, herbivorous fish biomass, macroalgal cover, temperature, and total suspended solids (TSS), supported by herbivorous macroinvertebrate biomass and coral disease prevalence. Therefore, WDT station is prioritized for monitoring and intervention.

Keywords: coral reef resilience; thermal stress; herbivory function; health disturbance and competition; Paiton PLTU.