Strategi Pengelolaan Ekosistem Mangrove Sebagai Nature-Based Solutions dalam Mitigasi dan Adaptasi
Perubahan Iklim di Teluk Benoa, Bali dan Pesisir Cilacap Tengah, Kabupaten Cilacap
Aulia Syifa Ardiati, Dr. Bachtiar Wahyu Mutaqin, S.Kel., M.Sc.; Prof. Dr. Djati Mardiatno, S.Si., M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Strategi Pengelolaan Ekosistem Mangrove Sebagai *Nature-Based Solutions* Dalam Mitigasi dan Adaptasi Perubahan Iklim di Teluk Benoa, Bali dan Pesisir Cilacap Tengah, Kabupaten Cilacap

Aulia Syifa Ardiati

23/524757/PGE/01578

INTISARI

Perubahan iklim, khususnya kenaikan muka air laut, menjadi ancaman bagi ekosistem mangrove. Selain itu, aktivitas antropogenik di sekitarnya juga berpotensi menambah stresor yang dihadapi ekosistem mangrove. Oleh karena itu, penelitian ini bertujuan menganalisis kerentanan mangrove, dampak stresor antropogenik, serta menyusun rekomendasi pengelolaan di Teluk Benoa, Bali dan Pesisir Cilacap Tengah, Cilacap berbasis grid berukuran 500 m × 500 m. Metode yang digunakan meliputi *Mangrove Vulnerability Index* (MVI) untuk menganalisis kerentanan mangrove, serta model *Integrated Valuation of Ecosystem Services and Tradeoffs Habitat Risk Assessment* (InVEST HRA) untuk menganalisis dampak stresor antropogenik terhadap ekosistem mangrove. Data kenaikan muka air laut tahun 2025 serta proyeksi tahun 2050 dan 2100 pada skenario SSP5-8.5 digunakan agar rekomendasi pengelolaan mencakup kondisi kenaikan muka air laut paling ekstrem.

Hasil menunjukkan laju kenaikan muka air laut di kedua lokasi melebihi 3 mm/tahun tanpa perbedaan signifikan, sehingga peta menggunakan tahun 2025 sebagai acuan. Ekosistem mangrove di kedua lokasi secara umum menunjukkan kerentanan rendah (55,51 – 110,66) dan sangat rendah (0,35 – 55,50) berdasarkan klasifikasi rentang nilai maksimum-minimum, yang mengindikasikan resiliensi biofisik yang baik. Namun, klasifikasi *natural breaks* menghasilkan kelas kerentanan yang beragam sehingga lebih informatif pada tingkat tapak. Ekosistem mangrove Bali memiliki rentang sangat rendah (27,38 – 54,77), rendah (54,78 – 73,84), sedang (73,49 – 84,84) dan tinggi (84,85 – 106,07). Adapun ekosistem mangrove Cilacap memiliki rentang sangat rendah (34,64 – 42,42), rendah (42,43 – 60,00), sedang (60,01 – 84,85), dan tinggi (84,86 – 94,86). Dari sisi stresor antropogenik, jalan tol dan permukiman merupakan stresor dominan di Teluk Benoa, sementara pertanian dan permukiman menjadi stresor utama di Cilacap. Rekomendasi pengelolaan dibagi ke dalam empat tingkat prioritas, mulai dari zona kritis yang memerlukan intervensi segera hingga zona aman. Pengelolaan mangrove di Bali relatif lebih terkendali karena telah diterapkan pembatasan akses kawasan, sedangkan di Cilacap diperlukan kolaborasi *multihelix* yang melibatkan pemerintah, akademisi, masyarakat, dan sektor swasta, khususnya melalui program *Corporate Social Responsibility* (CSR) dari industri yang berdekatan dengan kawasan mangrove.

Kata Kunci : Kerentanan mangrove, *Mangrove Vulnerability Index*, Stresor Antropogenik, InVEST HRA, Pengelolaan ekosistem mangrove

UNIVERSITAS
GADJAH MADA
**Strategi Pengelolaan Ekosistem Mangrove Sebagai Nature-Based Solutions dalam Mitigasi dan Adaptasi
Perubahan Iklim di Teluk Benoa, Bali dan Pesisir Cilacap Tengah, Kabupaten Cilacap**
Aulia Syifa Ardiati, Dr. Bachtiar Wahyu Mutaqin, S.Kel., M.Sc.; Prof. Dr. Djati Mardiatno, S.Si., M.Si.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Mangrove Ecosystem Management Strategy as Nature-Based Solutions for Climate Change Mitigation and Adaptation in Benoa Bay, Bali and Cilacap Tengah Coast, Cilacap Regency

Aulia Syifa Ardiati
23/524757/PGE/01578

ABSTRACT

Climate change, particularly sea level rise, poses a significant threat to mangrove ecosystems. In addition, anthropogenic activities in surrounding areas have the potential to compound the stressors faced by these ecosystems. Therefore, this study aims to analyze mangrove vulnerability, assess the impacts of anthropogenic stressors, and develop management recommendations for Benoa Bay, Bali and the Central Cilacap Coast, Cilacap, using a 500 m × 500 m grid-based approach. The methods employed include the Mangrove Vulnerability Index (MVI) to assess mangrove vulnerability, and the Integrated Valuation of Ecosystem Services and Tradeoffs Habitat Risk Assessment (InVEST HRA) model to evaluate the impacts of anthropogenic stressors on mangrove ecosystems. Sea level rise data for 2025, along with projections for 2050 and 2100 under the SSP5-8.5 scenario, were used to ensure that management recommendations account for the most extreme sea level rise conditions.

Results indicate that the rate of sea level rise at both locations exceeds 3 mm/year with no significant difference between sites, leading to the use of 2025 as the reference year for all maps. Mangrove ecosystems at both locations generally exhibit low (55.51–110.66) and very low (0.35–55.50) vulnerability based on maximum-minimum range classification, indicating good biophysical resilience. However, natural breaks classification yields more diverse vulnerability classes and is therefore more informative at the site level. Mangrove ecosystems in Bali fall within very low (27.38–54.77), low (54.78–73.84), moderate (73.49–84.84), and high (84.85–106.07) ranges. Meanwhile, mangrove ecosystems in Cilacap fall within very low (34.64–42.42), low (42.43–60.00), moderate (60.01–84.85), and high (84.86–94.86) ranges. Regarding anthropogenic stressors, toll roads and settlements are the dominant stressors in Benoa Bay, while agriculture and settlements are the primary stressors in Cilacap. Management recommendations are divided into four priority levels, ranging from critical zones requiring immediate intervention to safe zones. Mangrove management in Bali is relatively more controlled due to existing area access restrictions, whereas Cilacap requires multi-helix collaboration involving the government, academics, local communities, and the private sector, particularly through Corporate Social Responsibility (CSR) programs from industries operating in proximity to mangrove areas.

Keywords: *Mangrove vulnerability, Mangrove Vulnerability Index, Anthropogenic stressors, InVEST HRA, Mangrove ecosystem management*