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Analysis of Wave Characteristics on the Coastal Environment After the Construction of the Bajoe Port Pier in Bone Regency

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Abstract

This study aims to analyze wave characteristics following the construction of the pier at Bajoe Port, Bone Regency, with a particular focus on wave height, wave period, and wave direction. The data utilized consist of wind records, tidal observations, and field measurements. The analysis was conducted through wave hydrodynamic and transformation approaches, encompassing shoaling, refraction, and the estimation of significant wave parameters. The findings indicate that the construction of the pier has not produced a significant impact on the wave characteristics within the port area. Both wave height and period remain within the normal range in accordance with the prevailing oceanographic conditions. The pier primarily functions as a protective structure for part of the water body, without inducing major alterations in wave refraction patterns or energy distribution. Although the construction of the pier has the potential to influence coastal ecosystems, particularly in relation to sedimentation dynamics, local current circulation, and water quality, the results of the analysis demonstrate that changes in wave dynamics surrounding the pier are relatively minor. Consequently, the risk of habitat degradation caused by wave energy variations can be minimized. Seabed slope stability is also preserved, as there is no substantial increase in hydrodynamic forces that could potentially trigger erosion or submarine landslides. Furthermore, the reduction in wave intensity within sheltered areas may generate ecological benefits, creating calmer water zones that could enhance the growth of marine organisms such as seagrass and coral reefs. The construction of the pier at Bajoe Port not only contributes to an increase in maritime transport capacity but also sustains the ecological balance of the coastal environment. These outcomes provide a scientific foundation for sustainable port

management practices, emphasizing the integration of ecological considerations and the long-term functionality of coastal waters adjacent to the port area.