

**PEMODELAN SEBARAN SEDIMEN PASCABENCANA
SIKLON TROPIS SENYAR UNTUK MENGIDENTIFIKASI
PENDANGKALAN MUARA MENGGUNAKAN DELFT 3D DI
SUNGAI TAMIANG, PROVINSI ACEH**

TEKNOLOGI KONSTRUKSI BANGUNAN AIR

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ABSTRAK

Siklon Tropis Senyar yang melanda Aceh pada akhir November 2025 memicu banjir besar dan endapan sedimen tebal di Muara Sungai Tamiang, Kabupaten Aceh Tamiang, sehingga menutup alur muara dan meningkatkan risiko banjir susulan. Penelitian ini bertujuan mengetahui pola sebaran sedimen, mengidentifikasi karakteristik sedimen pascabencana, mengetahui faktor-faktor yang memengaruhi distribusinya, serta mengkaji dampaknya di wilayah muara sungai. Penelitian menggunakan metode deskriptif-analitik dengan pemodelan numerik Delft3D, didukung data primer (observasi, wawancara, dokumentasi) dan data sekunder dari Balai Teknik Pantai berupa data pasang surut, angin (Era 5), batimetri (Navionics), gelombang (Era 5), serta hasil uji laboratorium terhadap 15 sampel sedimen dari 7 lokasi di sepanjang sungai dan Muara Sungai Tamiang. Hasil penelitian menunjukkan ketebalan endapan sedimen mencapai sekitar 5 meter yang membentuk semacam bendung alami di mulut muara. Pada kondisi pasang tertinggi, sedimen terkonsentrasi di sekitar mulut muara, sedangkan pada surut terendah sedimen tersebar lebih luas ke arah laut menuju utara dan timur, dengan konsentrasi terpadat tetap berada di alur utama. Sebagian besar sampel didominasi fraksi pasir (65–85%), sementara sebagian lokasi lain didominasi fraksi lanau berlempung (70–95%), yang mencerminkan variasi energi hidrodinamika antarlokasi. Distribusi sedimen dipengaruhi oleh karakteristik pasang surut, arus,

gelombang. Sedimentasi pascabencana ini berdampak pada pendangkalan, pembentukan pulau baru, dan pergeseran alur muara, sehingga memerlukan pengelolaan berkelanjutan sebagai dasar mitigasi bencana dan perencanaan normalisasi Muara Sungai Tamiang.

Kata kunci: Muara Sungai Tamiang, sedimentasi pascabencana, siklon tropis, Delft3D, morfologi muara

ABSTRACT

Tropical Cyclone Senyar, which struck Aceh in late November 2025, triggered severe flooding and extensive sediment deposition at the Tamiang River Estuary, Aceh Tamiang Regency, resulting in the blockage of the estuary channel and an increased risk of subsequent flooding. This study aims to determine the sediment distribution pattern, identify the characteristics of post-disaster sediments, examine the factors influencing their distribution, and assess their impacts on the estuarine area. The study employed a descriptive-analytical method combined with Delft3D numerical modeling, supported by primary data (field observations, interviews, and documentation) and secondary data obtained from the Coastal Engineering Center, including tidal data, wind data (ERA5), bathymetric data (Navionics), wave data (ERA5), and laboratory test results from 15 sediment samples collected at seven locations along the river and the Tamiang River Estuary. The results indicate that sediment deposits reached a thickness of approximately 5 meters, forming a natural barrier at the estuary mouth. During high tide conditions, sediments were concentrated around the estuary mouth, whereas during low tide they were distributed more widely offshore toward the north and east, while the highest sediment concentration remained within the main channel. Most sediment samples were dominated by the sand fraction (65–85%), whereas several other locations were dominated by clayey silt (70–95%), reflecting variations in hydrodynamic energy among the sampling sites. Sediment distribution was influenced by tidal characteristics, currents, and waves. This post-disaster sedimentation resulted in channel shallowing, the formation of new sedimentary islands, and shifts in the estuary channel, highlighting the need for sustainable

management as a basis for disaster mitigation and the planning of Tamiang River Estuary normalization.

Keywords: *Tamiang River Estuary, post-disaster sedimentation, tropical cyclone, Delft3D, estuarine morphology.*

