

This study addresses the severe beach erosion at Wolcheon Beach following the Samcheok LNG terminal's large-scale reclamation project. The authors use a shoreline change model, validated with satellite imagery, to analyze the effects of altered littoral drift (LST). The research is highly relevant given the increasing global issue of coastal erosion due to anthropogenic activities and climate change. The study provides valuable insights into predictive modeling and potential mitigation strategies. However, while the study presents strong empirical evidence, some aspects require further clarification, particularly regarding model assumptions, validation methodology, and the applicability of proposed mitigation measures. Below is a detailed critique.

### Strengths of the Study

#### Timely and Relevant Topic

- Coastal erosion due to large-scale infrastructure projects is a pressing issue, and the study highlights an extreme case with real-world implications.
- The integration of satellite data and numerical modeling is commendable, as it allows for a robust spatiotemporal analysis.

#### Methodological Rigor

- The study effectively uses Google Earth Engine for satellite-based shoreline detection, a reliable method that enhances the spatial resolution of shoreline change assessment.
- The use of the Parabolic Bay Shape Equation (PBSE) to propose mitigation measures (e.g., groins) is methodologically sound and aligns with coastal engineering principles.

#### Clear Identification of Impacts

- The analysis clearly demonstrates the severe impacts of the Samcheok LNG reclamation on Wolcheon Beach, substantiating claims with quantitative LST analysis.
- The discussion on wave diffraction effects and their role in exacerbating LST-induced erosion is insightful and well-supported by existing literature.

#### Oversimplification of Sediment Transport Processes

- The one-line shoreline change model assumes uniform longshore transport but does not account for cross-shore dynamics (e.g., storm-induced sediment suspension and offshore transport).
- While wave diffraction effects are discussed, the study lacks wave energy dissipation analysis, which could refine the understanding of sediment transport pathways.

#### Insufficient Discussion of Seasonal and Climatic Variability

- The study acknowledges seasonal variations in erosion rates, but no specific meteorological events (e.g., storms, typhoons) are analyzed to determine their relative influence.
- The role of sea level rise (SLR) and climate-driven changes in wave energy is not addressed. Given the long-term relevance of coastal management, this omission limits the broader applicability of the study.

## Mitigation Strategies Require Further Justification

- The proposed groin installation is based on the PBSE approach, which is widely used in coastal engineering. However:
  - The optimal groin spacing and expected sediment retention efficiency are not thoroughly quantified.
  - The authors should discuss potential adverse effects of groin structures, such as down-drift erosion or sediment starvation in adjacent coastal areas.
- Alternative mitigation measures (e.g., beach nourishment, submerged breakwaters) should be compared in terms of cost-effectiveness and environmental impact.

## Recommendations for Improvement

### Expand Discussion on Mitigation Strategies

- Justify groin placement and spacing with numerical simulations of sediment retention efficiency.
- Compare the effectiveness of groins vs. beach nourishment vs. submerged breakwaters in mitigating erosion at Wolcheon Beach.
- Discuss potential negative consequences of groin installation.

This study provides important insights into the consequences of large-scale coastal reclamation on sediment dynamics. The integration of satellite-based shoreline change detection with numerical modeling is a significant strength, and the proposed mitigation strategies are valuable for coastal engineers and policymakers.

However, to improve its impact and applicability, the study should:

I suggest replacing the adjective "catastrophic" with an equivalent, such as "substantial". I also suggest clarifying which variables contribute to the RMSE, which also assumes non-negligible values. Expand the discussion on the limitations of the method and discuss the uncertainty associated with the proposed solutions..