

“The Potential Dangers of Climate Change on the Coast affect sea transportation, land and maritime tourism...”

Context and Issues

Climate change causes changes in rainfall patterns, rising sea temperatures, rising sea levels, and extreme climate events. As a consequence, these changes will present a danger that threatens the survival of human life. In the coastal sector, climate change in general can cause two types of hazards, namely coastal inundation and coastal instability related to abrasion / erosion processes and coastal accretion / sedimentation. The issue of coastal region vulnerability is very relevant to infrastructure development that is being promoted at this time, which invites the community to manage the sea and the nation ambition to become the world's maritime axis. The study aims to update the studies that have been carried out previously in 2009, so that it is in accordance with the present conditions (baseline) and can be used for planning purposes (projections) of Indonesia's regional development.

The CVI (Coastal Vulnerability Index) calculation considers six physical parameters which are all related to hazard and potential of coastal damage (or coastal destruction vulnerability), namely: coastal geomorphology, coastal slopes, sea level rise, level of coastal erosion, ocean tides and waves (Thieler, Williams and Beavers, 2002)

Oceanographic parameters (relative sea level rise, maximum tidal range and significant wave height) tends to have an effect on a regional scale. Meanwhile, the developed parameters of coastal instability, especially from geological parameters, tend to have a distribution effect on a local scale. This locality factor is very important in determining the level of coastal vulnerability of an area, and has a high value in vulnerability index calculation.

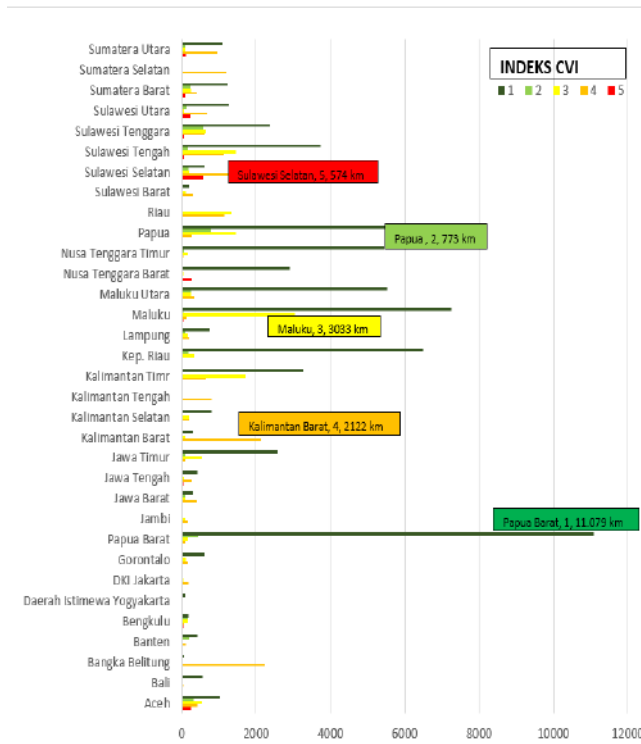
The study of climate change hazards on the coast includes 7 (seven) major islands in Indonesia, namely Sumatra, Java-Bali, Kalimantan, Sulawesi, Maluku, Nusa Tenggara and Papua. In addition to the coverage of 7 (seven) islands, the assessment of climate change hazards on the coast also takes into account the value of CVI in 33 provinces in Indonesia.

CVI Calculation Results Table based on each Island Hazard Classification

| Wilayah Pulau | Indeks CVI | | | | |
|-----------------|----------------------|----------------|-----------------|-----------------|----------------|
| | (Panjang Pantai, Km) | | | | |
| | 1 | 2 | 3 | 4 | 5 |
| Sumatera | 10824.93 | 1054.45 | 2989.37 | 6769.58 | 487.49 |
| Kalimantan | 4379.84 | 37.77 | 2008.24 | 3782.24 | 0.00 |
| Jawa dan Bali | 4368.09 | 420.13 | 760.27 | 1106.41 | 99.32 |
| Sulawesi | 8807.00 | 1102.99 | 2608.58 | 4134.06 | 904.51 |
| Nusa Tenggara | 8334.63 | 72.17 | 205.08 | 40.96 | 279.04 |
| Maluku | 12802.45 | 288.26 | 3276.91 | 472.97 | 49.15 |
| Papua | 16965.49 | 1211.83 | 1598.78 | 354.35 | 0.00 |
| Total Km | 66482.43 | 4187.59 | 13447.23 | 16660.57 | 1819.51 |

Coastal Vulnerability Index by Islands

The CVI calculation resulted in the total length of the coastline affected in Sumatra Island with a very high vulnerability index (index 5) of 487.49 KM, Java and Bali (with a very high vulnerability index (index 5) of 99.32 KM, Sulawesi Island with a very high vulnerability index (index 5) of 904.51, Nusa Tenggara Islands with a very high vulnerability index (index 5) of 279.04 KM, Maluku of 49.15 KM, while for the island of Kalimantan and Papua do not have a coastal vulnerability index with Index 5 class categories.



Coastline length with each CVI categories in each province

Coastal Vulnerability Index by Provinces

The results of the CVI calculation in 33 provinces concluded that Aceh Province was the region with the highest vulnerability. Sumatra Island with a total coastline that has a very high index of 251.97 KM. In the eastern part of Indonesia, it is generally seen that the eastern region has low level of vulnerability. The provinces of Papua and West Papua can be categorized as areas that have low vulnerability because they do not have coastal areas with a very high vulnerability index (Index 5). Whereas for regions that have high vulnerability in eastern Indonesia, South Sulawesi province has a vulnerable coastline length (Index 5 and Index 4) respectively reaching 573.23 KM and 1258.17 KM.

Implication

The most dominant factors in determining the vulnerability index are the beach slope and erosion / accretion. Areas that have a high level of vulnerability are areas where the slope of the coast is relatively sloping and has a large erosion / accretion index. Areas that have a low level of vulnerability are areas that have steep coastal slopes and low erosion / accretion indexes.

The climate change hazard in coastal has implications on many sectors or sub-sectors, such as:

- Sea and land transportation, which is related to port infrastructure, break water, sea wall, jetty, as well as land roads protections around the coast; and
- Marine and coastal tourism which affects the travel comfort and building resistance at the beach.

Policy Recommendations

1. Need to strengthen law enforcement instruments as a legal effort for coastal and marine management;
2. Integrated coastal spatial planning need to create and determine zoning in coastal areas as well as the functions of the region, including preservation zone, conservation zone and intensive use zone;
3. Implement rehabilitation / reforestation of mangroves / mangroves, especially in protected areas, cultivation, and areas affected by climate change hazards;
4. Coastal zones and islands zoning plans carried out by the Ministry of Maritime Affairs and Fisheries need to consider the impact of hazards caused by climate change; and
5. Institutional consideration and authority in management of conservation areas between the Ministry of Environment and Forestry and the Ministry of Maritime Affairs and Fisheries.

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