Chapter 14
Coastal Protection and Rehabilitation Technology as Climate Mitigation and Adaptation Strategies

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ABSTRACT

The north coast of Java Indonesia is an area threatened by erosion due to rising sea levels triggered by climate change. Sayung District, Demak, which experienced severe erosion impacts. Restoring lost sediment is an effective way to stop erosion processes and restore a stable coastline. In this chapter, the strategies of coastal protection carried out are presented with the ultimate goal of restoring the natural defense of the coast, namely, mangroves. The first step is to build a coastal protective building to reduce waves and create calm waters. It will accelerate the sedimentation process so that new sludge-substrate land will be formed that is suitable for mangrove ecosystem growth. This coastal erosion mitigation activity is an effort to increase the resilience of coastal areas from physical aspects that cause deterioration or reduction of coastal functions. The concept of building together with nature has a very high technical, socioeconomic, and environmental feasibility because it is a coastal engineering approach as one of the solutions to the problem of sustainable erosion.

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INTRODUCTION

The growth of the population, the extensive economic developments, industrial expansion, and enormous human activity, all produced greenhouse gas emission that leads to global warming and climate change. Climate change poses many threats to the balance of the environment as well as human life. Many places around the world have experienced changes in rainfall season that caused more floods, droughts as well as severe heat waves. The oceans are warming and the ice is melting, causing the rising of sea level. These unbalanced environmental conditions and ecosystem damage present challenges to our society and our environment especially threatening food security. Food security is the most visible and immediate problem that arises after the occurrence of natural disasters/damage. This will affect all aspects of food security starting from the aspects of food availability, distribution, consumption, and safety. Increasing human awareness of the environment is indispensable to minimizing the negative impact of some human activities on the environment. One of the efforts that can be done by the community in reducing environmental damage is to apply the concept of being environmentally friendly.

Coastal areas have many problems related to the environment, especially water dynamics. Existing problems occur due to many dynamic physical processes, including 'tidal' floods, land subsidence, a rise in sea level, and erosion sedimentation. These processes play an important role in coastline changes that occur in coastal areas (Marfai et al*.,* 2006).

The North Coast of Java is an area threatened by erosion disasters due to rising sea levels triggered by climate change. Sea level rise also causes changes in ocean currents in coastal areas and destroys mangrove ecosystems (Sugianto et al*.,* 2018). The North Coast of Java wave is a type of wave that is generated by the wind. The propagation of waves to shallow waters will reduce speed but produce greater energy and wave height, which can cause eroding of bottom sediments, causing a reduction in the land. Demak Regency, Central Java, Demak Regency is located in the central Java Province, Indonesia with an area of 1,149.07 km^2, which consists of a land area of ± 879.43 km^2 and a sea area of ± 252.34 km^2 (Hawati et al*.,* 2017). Demak Regency is an area with high erosion and coastline reduction problems. The erosion that occurred in the Sayung District area occurred from 1991 until now with the eroded area reaching 2,073.7 hectares (Ismanto et al*.,* 2017). If left unchecked, this condition will be very detrimental to the coastal community of Demak due to the loss of residential land and to carry out activities.

Based on data from the Indonesian Ministry of Maritime Affairs and Fisheries, almost 80% of the mangrove forests in the northern coastal area of Java have been damaged and have disrupted coastal security. In 2014, nearly 750 km of 1,690 km of coastline were eroded, and 130 km2 of mangrove habitat was lost. This condition