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The managing plan for abrasion in coastal area of Garut Regency

Rita Rostika[a,*], Noir Primadona Purba[a], Muhammad Lutfi[a], Jaya Kelvin[b], Irfan Silalahi[b]

[a]*Faculty of Fisheries and Marine Science, Padjadjaran University, Jl. Raya Bandung Sumedang KM 21, Jatinangor 40600*
[b]*KOMITMEN Research Group, Padjadjaran University*

Abstract

The area of Garut is located in the southern part of West Java and directly connects to the Indian Ocean. Due to large coastal area of about 73.25 kms, it is susceptible to the impacts of abrasion due to strong waves, high tides, and human activities. This research aims to contrive a managing plan for abrasion control in coastal area of Garut Regency during September to November 2012 that includes, compiling recorded documents of the existing condition to predict the changes of coastal pattern as well as determining priorities for sustainable coastal developments by establishing intersectional programs in order to optimize the operational projects in coastal areas. To support the research, the data are divided into, first, primary data that include physical and social facts and Figures of socio-economic, oceanographic, and meteorological conditions. The second ones, the secondary data, consist of scientific-driven environmental and geographical information, such as visual map of Indonesia, Landsat TM images, (GLOVIS), basic map from the local government, sea level rise (TOPEX/POSEIDON JASON1, JASON2), sea wave, and wind (BMKG), and legal materials, such as policies and regulations, as well as institutions. Analysis on the data is conducted to determine the biological conditions of the waters, to identify changes in sea surface and in coastal lines, and to formulate an abrasion modelling. The results show that abrasion and accretion occur in different levels and indicates that ecosystem plays an important role in controlling the abrasion, particularly in the areas where the mangrove ecosystem is located. The impacts from abrasion are more due to natural factors than human activities. Therefore, it is suggested that an integrated management in the form synchronization programs with related institutions is initiated and developed a series of schemes that become priorities for the local development.

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Keywords: abrasion; accretion; coastal area; Garut Regency; managing plan.

* Corresponding author. Tel.: +62-812-237-2988.
*E-mail address:*ritarostika_unpad@yahoo.com.

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1. Introduction

Having coastline of about 73.25 kms, the Garut Regency coastal area, located in the southern part of West Java and situated closely to the Indian Ocean, is vulnerable to the environmental degradation due to both human activities [1] and natural phenomena [2]. Coastal areas have been known for their vulnerability to the impacts of abrasion caused mainly by powerful currents [3] and high tides [4]. The type of current causing abrasion is the longshore current that carries high-potential risks, and the tide in the south coast may reach four meter height. In addition, coastal areas are also the place where the land has been developed for and converted to housings, infrastructural establishments, as well as fishing and farming businesses. In order to overcome this abrasion problem in Garut, it is important to start a planning for coastal management. In this regard, it is suggested that the local government to implement policies in developing the area's potentials.

This research, aims to compile bio-historical documents containing the previous and current conditions and predictions of coastal patterns. It is also to determine priorities in the sustainable developments of the coastal area by planning inter-sectoral programs to optimize the area's potentials of maintaining environmental sustainability and human activities.

2. Method

Research was conducted in September-November 2012 in Garut Regency, West Java (Fig..1). Primary data were collected by conducting research measurement previously determined from secondary study and initial analysis results. Secondary data consist of institutional data, questionnaire statistics report, and literary research. Primary data include socio-economic facts and oceanographic and meteorological Figures (coastal characteristics, currents, tides, tidal waves, winds, and coastlines), while secondary data range from visual map of Indonesia, Landsat Thematic Mapper images (GLOVIS), basic map from the Garut Regency's government sea level rise (TOPEX/POSEIDON JASON1, JASON2), sea waves (http://ecmwf.int/), winds (BMKG), to policies, regulations and institutions. The data are analyzed to determine the environmental conditions of the waters, changes in sea level rise and in coastline (radiometric correction, geometric correction, cutting image, masking), and abrasion modelling.

Modelling is conducted using softwares Sea-Surface Modelling System (SMS) and MIKE21 with Generalized Model for simulating shoreline (GENESIS) method, a numeric modelling system designed for performing simulation for change in coastline. This enables prediction for longshore transport rate and change in coastline caused by sediment transport with or without coastal security structure in particular period of time.

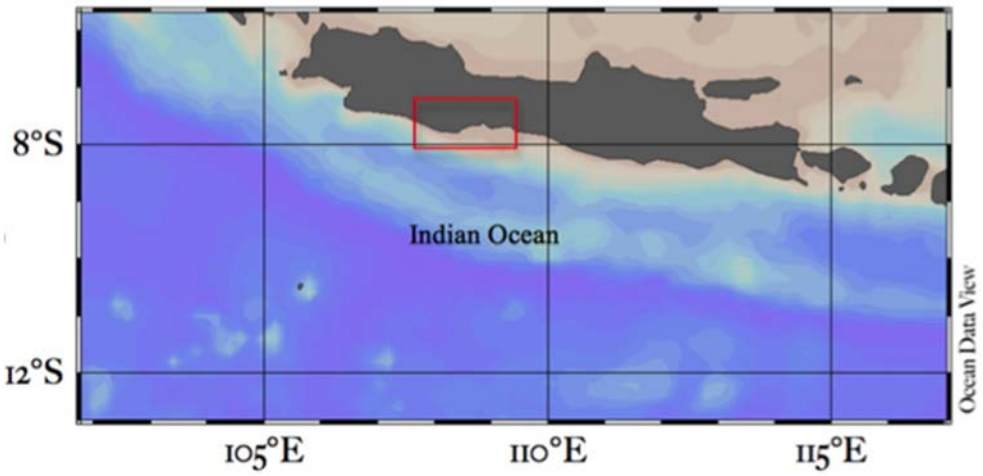

Fig. 1. Research location [5]