A HYDRO-OCEANOGRAPHIC STUDY: CASE IN TANAMAITA BUTON DISTRICT SOUTHEAST SULAWESI – INDONESIA

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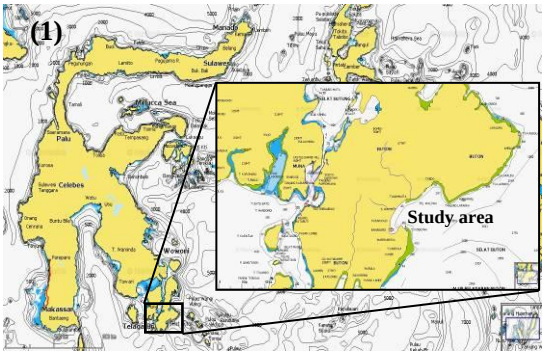
1. INTRODUCTION

Coastal topographic changes are influenced by the rate of sediment transport due to current and wave. Coastal erosion or sedimentation is very important on the supply of sediment entering or leaving the coastal system (Mustari *et al*., 2010). The most important environmental parameters for determination of coastal morphology are wind, wave, current, water level, sediment transport phenomena and its supply which should be well known. The shoreline position and its rate of change constitute the basic information required for conducting many coastal engineering studies (Kraus and Rosati, 1997). It is important to understand the characteristics of wave and current since the dominant direction of sand transport depends on them. The impacts of these coastal changes include loss of life and property, changes in coastal socioeconomic environments, and decrease in coastal land resources. In the recent decade, greater demands for recreation and tourism have led to a significant increase in the occupation of coastal areas.

The area of coastal erosion and deposition majorly result by the change of shoreline. In case of Tanamaita, that is the target area in this study, the coastal areas immediately adjacent to the southern part of Flores Sea. This study attempts to analyze the wave simulation model using Surface Water Modeling System (SMS) and describe the hydro-oceanographic conditions around Tanamaita in Buton district. The benefits of this research is to determine the condition of Hydro-oceanography and performance to the level of stability of Tanamaita coastal area, it can be used as a reference for future planning of the waterfront development.



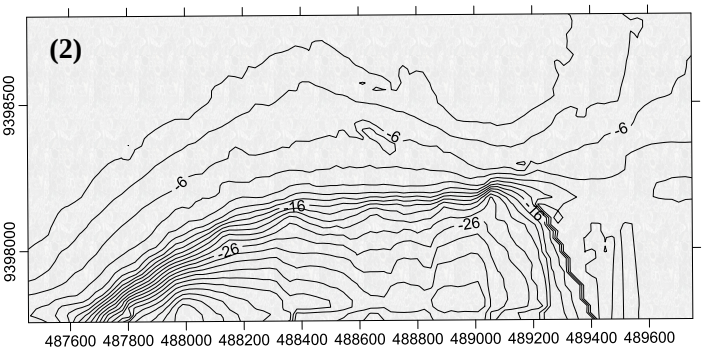


Fig 1: Study area of the Meta land located in Pasarwajo, Buton District Southeast Sulawesi province
Fig 2: Bathymetric around the research study at Tanamaita

2. STUDY AREA

Tanamaita is one of the coastal areas located in Pasarwajo, Buton District Southeast Sulawesi province. The general description of the study area is shown in Fig. 1. Tanamaita is becoming a development region particularly related to water such as marine tourism and fishing considering the panoramic sea which is very interesting. The livelihood of the majority of inhabitants is as fishermen and the uniqueness of this area at the turn of the season. As coastal areas directly adjacent to the Flores Sea on the southern part, the region would need the attention of Government given the magnitude of ocean waves which can cause erosion around the research study. The settlements are close and will certainly lead to a decline in the coastline that could threaten public housing along the coast. Therefore, the countermeasure planning for the coastal area is necessary.

3. METHODOLOGY

The method used in this research is the collection of primary data in the form of field data collection, namely bathymetry survey, tidal survey and secondary data retrieval of wind data. Furthermore, the data obtained is simulated model using Surface-water Modeling System (SMS) software. The bathymetry survey was measured around the Tanamaita using GPS map 585C. The data is obtained from a sea bottom with the horizontal coordinate UTM system and the depth of the sea at the time, including time of measurements point. The depth data of the sea is calculated by correcting the sea level due to the influence of the tides. The surface level of tides used as a reference is the mean water level MSL. The Least Square method used to analysis the MSL elevation based on data from 15 periods of tidal observations. The wave prediction was conducted using a BOUSS2D model. The result of bathymetry survey is displayed in Fig. 2.

4. RESULT AND DISCUSSION

Tidal oscillation around the measurement area at Tanamaita is classified as semi-diurnal tide can be predicted by using the formula Formzhal Number (FN). The measurements of tidal from August 9 - 23, 2014 (15 days) with an interval time of 1 hour. The water level readings based on reference point. The most prevailing is incoming wave from the east direction. These wave conditions generate long shore current and sediment transport from the east to west direction. This tide level change induces large quantities of water exchange around the research area at Tanamaita.

The method used for calculating the tidal constant is the harmonic analysis using the Admiralty method. Tidal constant in the study area is the result of the analysis conducted in 7 schemes. The scheme resulted in 10 Admiralty method tidal constant which will determine the type of tidal in research location. Using the observation data and the results of water level predictions, the comparison of water level chart as a function of time between the observation data and the prediction results can be obtained, with maximum 2.18 m elevation.

This study used a BOUSS2D wave prediction model which is versatile. Fig. 3(a), 3(b) and 3(c) shows the result of wave simulation from wave vector, significant wave height and wave directions respectively. The significant wave heights occurring in the water of the existing project area in the middle part of the sea that occurred in the wave generation zone, long before reaching the coast is indicated by the color of bluish green contours displayed in Fig. 3(c). Meanwhile Fig. 3(d) shows the topographic change around the research study at Tanamaita.

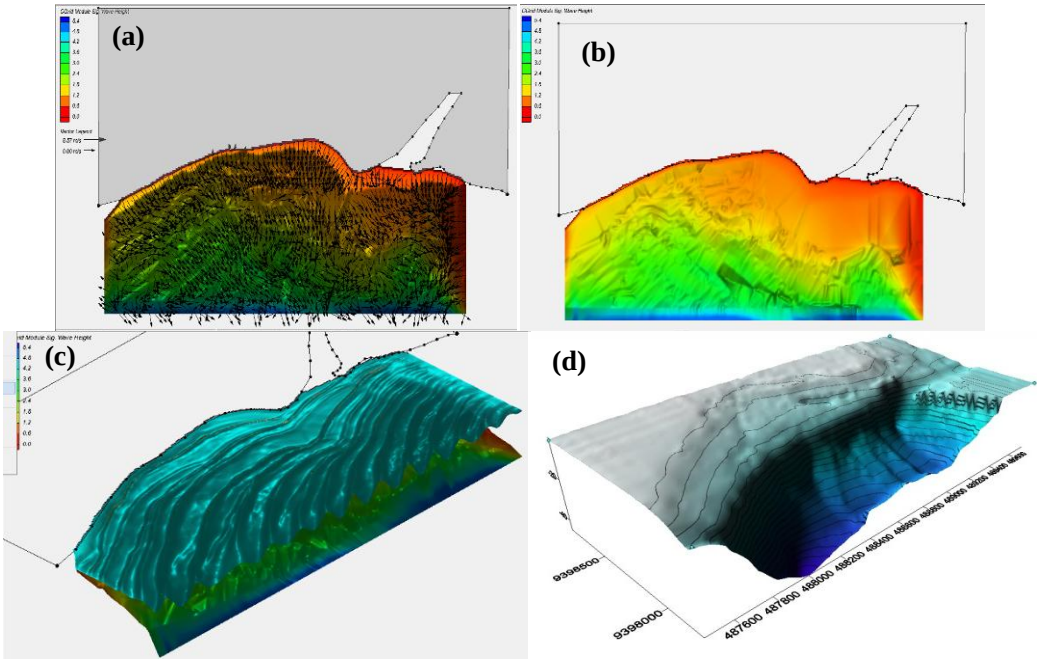


Fig 3: (a) Wave Vector, (b) Significant Wave Height, (c) Wave directions,
(d) Topographic change around the research study at Tanamaita

5. CONCLUSIONS

Based on the wave simulation model using Surface-water Modeling System (SMS) software, it is known that the significant wave height occurs in the waters of the sea on the wave generation zone, long before reaching the coast and is indicated by the color of bluish green contours (Fig. 3(c)), while wave heights reaching the coast are around 0 to 0.6 m and 0.6 to 1.2 m with a model of wave propagation from the east to the west. Therefore, for the planning of the retaining wall of waves, it is better to use the maximum wave height to coastal areas at 1.2 m.

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