The Coastal Platform Morphodynamics Characteristics Belang Bay, North Sulawesi Province

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Abstract. Coastal dynamics represent change from time to time, could be the form of coastal presenting effect of sedimentation and earn also in the form of coastal backing effect of erosion. This research of coastal morphodynamics on Belang Bay, will study by some aspect that is: beach morphology, grain size sediment and hydrodynamics activity. The purpose of this study is to see how far the influence of the morphodynamics of the coastal damage and sensitivity (susceptibility) coastal sea water due to the influence of hydrodynamics. Method of data collection and analysis, two main parameters were measured wave energy and beach characteristics. Knowledge on the morphodynamic behaviour of beaches was obtained from a topographic measurements of 15 beach transects normal to the coastline. Widely used morphodynamic parameters, like the Surf Similarity and the Surf Scaling parameters, were applied to the data, resulting in a general morphodynamic characterization of beaches, represented in a map of beach type distribution. In molompar beach identified by sediment material vary between finesand up to coarse sand which is distribution in each coastal circulation cell of Molompar beach.

Keywords: *hydrodynamics, morphodynamic, surf, similarity, coastal*

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1. Introduction

Coastal dynamics is a change from time to time, may be due to the promotion of sedimentation and beach can also be a beach retreat due to erosion. In addition, the beach is changing from time to time may be due to a decrease drowning coastal land or sea level rise and may also be the result from agradation mainland coast or degradation of marine sandstone (Sampurno, 2004). In many coastal environments, hydrodynamic activity of sea water is the main agent of destruction along the coast, coastal morphology change and development is influenced by the beach and the beach material (Balsille, 1986; Lawrence, 1994). Processes that lead to the main beach morphological dynamics are erosion and sedimentation (Ritter et al, 1995). In the morphodynamics study Belang Gulf coast (Figure 1), will be studied several aspects: morphology beach (beach morphology), sediment grain size (sediment grain size), hydrodynamic activity (Hydrodynamics Activity) of these three aspects in the next match with a parameter beach morphodynamics (Benevante et al, 2002). The purpose of this study is to see how far the influence of the morphodynamics of the coastal damage and sensitivity (susceptibility) coastal sea water due to the influence of hydrodynamics.

Selection of study sites was based on the importance of conducting research as for selected locations in the bay Striped Molompar entered exactly in the villages in districts Belang, South East Minahasa regency. Geographically village located 0o57'21.13" N and 124°48'54 .85" E (Figure 1).

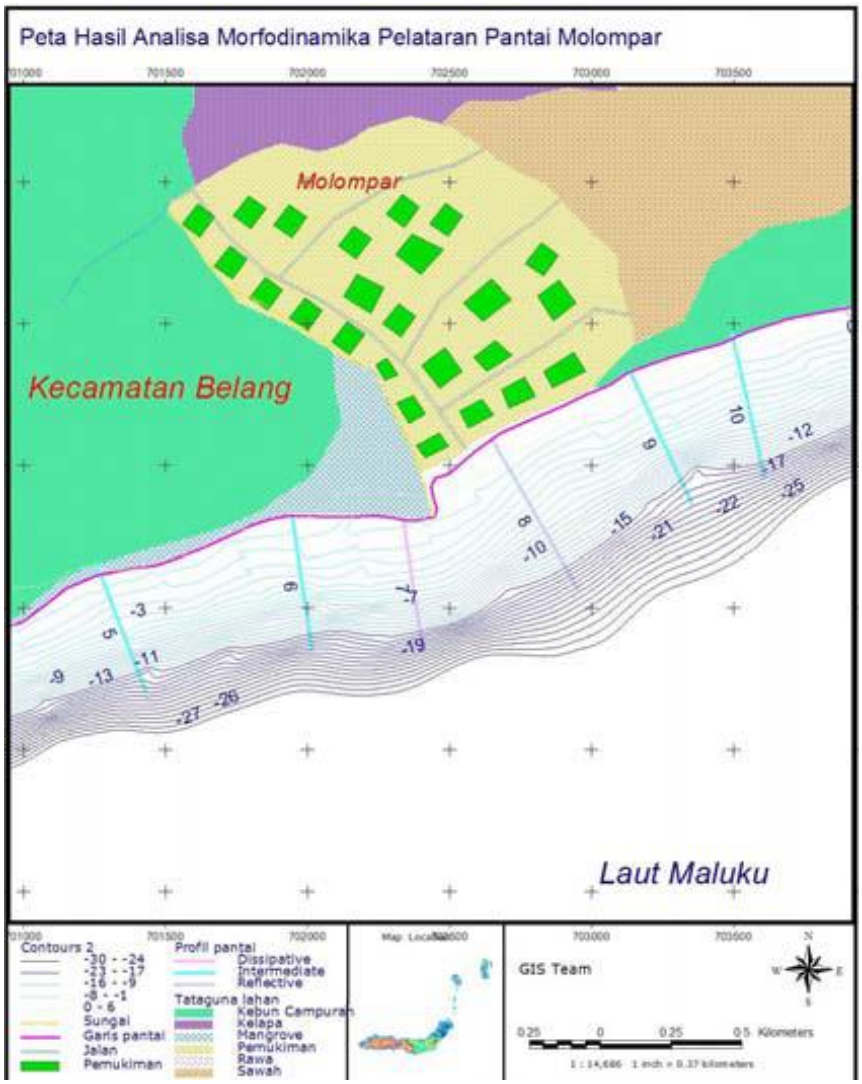

Figure 1: Research location in Molompar Beach

In geomorphology Molompar beach has a character that has a shoreline reefs, sand, gravel, gravel, boulders and coastal mangroves with moderate relief (PPGK, 1996). Furthermore, the dominant process that occurs at this beach is the process yesterday with a big wave and menghepas directly along the beach. Geological conditions of the area consists of alluvium rock (fan alluvium with moderate slope) and swamp sediment that extends from the south to the north is limited by two rivers namely River and River Molompar Minanga (Sapta Adhi Pratama, 2006).

2. Research Methodology

Method of data collection and analysis, two main parameters were measured wave energy and beach characteristics. The condition of coastal morphology is obtained by directly observing the Molompar Village down the beach from the river to the north until the Minanga River. Wave observations done visually by using two observers who placed signs in the breaking wave (breaker zone). Observations were made in a row during the study with the observation interval for 15 minutes. Parameters measured wave is the wave direction (α), wave height (H) and wave period (T). Furthermore, sediment samples taken systematically with Van Veen sediment grab then, analyzed sediment grain size (φ mm) using a scale of Wenworth-Udden. Grain size in use is the medium grain size or D50. Meanwhile, coastal morphology, which is measured beach slope (tan β), throughout the study area by making a longitudinal transect (vertical) out to sea. In this study, the classification of coastal conditions based on the three (3) parameters are commonly used in coastal engineering namely: Surf Scaling (Guza and Inmann, 1975), Surf Similarity Parameters (Battjes, 1974), and the Dean Number (Dean, 1973). Furthermore, Surf Scaling Parameter (Wrigth and Short, 1984), is to divide the state beaches classified as follows reflective when ξb> 2, ε <1 while dissipative ξb <0.3, ε> 30. Whereas, Dean Number is to calculate the relationship between the wave and sediment characteristics:

$$\boldsymbol{\Omega = \frac{H_b}{W_s} T}$$

Where, Ws is the sediment settling velocity obtained from 273D501.1 (mm), Hb is wave height breaker (meter). By Wright et al (1985), Dean Number to classify coastal state that is reflective (Ω<2) while the dissipative (Ω>5).

3. Results and Discussion

From the results of the measurement and analysis of data on the characteristics of the beach and other parameters such as sediment grain size (D50, medium grain size), beach slope (intertidal slope, β), Fall Velocity Sediment (W) are shown in Table 1.

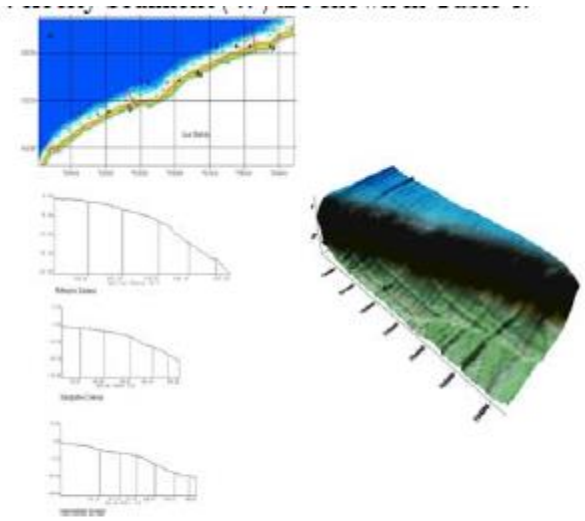

Figure 2: Surf scaling parameter in Molompar Beach

From the table above can be explained that, measurements were taken at 15 beach profiles using the Nikon electronic theodolite measuring tool for land and for bathymetry (ocean depth) with video sounder Eagle 128, while the geographical position in GPS Garmin C-60. Variations measured beach profile slope is 3.920-6.740% (Figure 2) with the variation of beach slope will berdapmpak on marine activity, the influence of longshore current with a very small angle coming wave is 300, whereas in the breaking wave angle formed by the depth of 70 meters the waves broke 0.52. Furthermore, the beach profile can be seen in Figure 2, is an analysis of field data using software Surfer 11 and ArcGIS 10.1, found that of the 15 profiles measured beach there are three (3) Surf Scaling Parameter form, namely: For Reflective beaches, located on profile 1, 8, 11 and 14, while for Intermediate beach on profiles 2,3,5,6,9,10,12,13 and 15, Dissipative beach on profiles 4 and 7 (Figure 3).

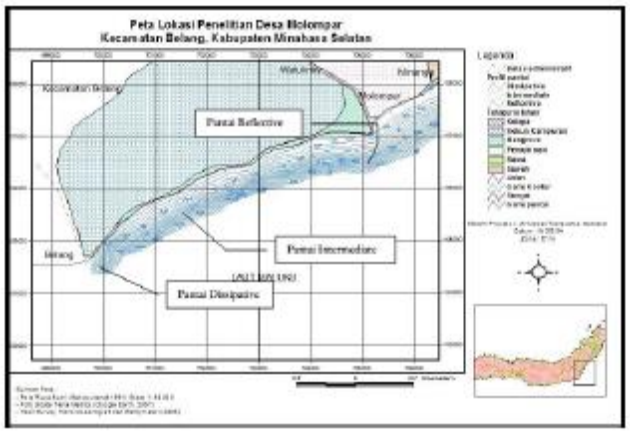

Figure 3: Surf scaling distribution in Molompar Beach

Table 1. The result analysis beach characteristics and supporting parameter

No Profil	D50 (mm)	Beach Slope (β)	Fall Velocity (W)	Ω	Remarks
1	0.99	6.74	2.69	0.76	Reflective
2	0.37	4.24	0.93	2.20	Intermediate
3	0.38	4.24	0.95	2.14	Intermediate
4	0.13	4.49	0.28	7.17	Disippative
5	0.82	4.10	2.20	0.93	Intermediate
6	0.26	4.95	0.63	3.26	Intermediate
7	0.13	4.14	0.30	6.77	Disippative
8	0.58	3.90	1.49	1.37	Reflective
9	0.28	3.92	0.68	3.00	Intermediate
10	0.19	4.01	0.44	4.67	Intermediate
11	0.77	4.21	2.06	0.99	Reflective
12	0.95	4.45	2.57	0.79	Intermediate
13	0.21	4.44	0.50	4.09	Intermediate
14	0.66	4.24	1.74	1.17	Reflective
15	0.21	4.20	0.50	4.12	Intermediate

Results of calculation of sediment grain size, beach slope, sediment fall velocity and surf scaling parameter morphological parameters in Table 1 shows the difference although the distance between the profiles measured adjacent beaches. This suggests that, at each measurement location are coastal circulation space (Coastal Circulation Cell), along the coast molompar. By Duxbury et al, 2002, that, the sediment chamber circulation originated from source to sediment deposition area. Generally in areas characterized by sediment deposition flat and round, as found in estuaries molompar that could mean that the source of sediment from the river molompar while the deposition area is in its mouth. Coastal circulation chamber can be identified as a separate room, which is in the indoor railing beach waves and currents transport sediment material. In coastal sediments molompar identified material varies between fine sand to coarse sand were distributed at each booth Molompar coastal beaches. With ± 15 km long coast, will have a good supply of river sediment Molompar or activity of marine hydrodynamics Maluku. Furthermore, the court beach (Shore Platform) Molompar have slope varies between 3.920-6.740%, palataran beach is not flat, but sloping gently sloping towards the sea, where by Ritter et al. (1995), informed the court that the coast can be eroded in waters with depths <10 m.

4. Conclusion

From these results it can be concluded that the state court morphometry a beach can affect the configuration of the natural beach, where the influence of hydrodynamics of marine activities such as longshore current and wave action can cause erosion. Relflective beach shape, intermediate and dissipative is one way to monitor changes in coastal morphology change at any time. Molompar beach is one of the areas of sediment deposition, the deposition of sediment supply in the area has become one of the natural coastal protection in case of storms and large waves. This study tried to assess that beach morphodynamics can be used as a tool in assessing the existence or condition of coastal erosion by dividing the coastal area (coastal circulation cell) located along the coast. Benefits of this study may be one of the supporters in the coastal areas of sustainable arrangement.

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