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Spatial use deviation in Coastal Border Area (Case study: Tanjung Pasir Village, Banten, Indonesia)

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Abstract. Coastal Border Area would prevent coastal erosion and protect the coast from activities that may interfere with or impair the functionality and sustainability. Tanjung Pasir is a coastal village that needs to be established as a coastal border area. This area is included in the local protected area which must function properly. Increase of activities has disrupted local protection functions such as abrasion and tidal floods. The purpose of this study is to identify activities that disrupt the function of the coastal border area as a local protection area in Tanjung Pasir Village. The research method used is descriptive method with a case study approach and cross section research design and analyzed by spatial techniques. The results of this study are the pond in segment 1 by 100%, protected area as a mangrove forest in segment 2 by 40%, in segment 3 of residential activities by 100% and in segment 4 of tourism and embankment by 100%. The protection function is only in segment 2. There is a mismatch between the land use plan with the Spatial and Regional Planning. Land use changes in segment 1, segment 3 and segment 4 cause disturbances in ecological and socio-economic aspects.

1. Introduction

Coastal Border Area would prevent coastal erosion and protect the coast from activities that may interfere with or impair the functionality and sustainability [1]. Coastal Border Area is included on a local shelter area. Protection on coastal border area is implemented to protect coastal area from any activities that might disrupt coastal function preservation [2,3].

Coastal ecosystems such as mangrove forest, reefs, and sea grass are important biological resources, which also act as germ plasma that provide great benefits for coastal area in a form of natural panorama that would bring potential for tourism, [arts](#), and urban society that contains vast natural resources [4-6]. However, the inclusion of cultural and economic activities in coastal areas such as housing, pond fisheries, and tourism can disturb the local protection function of the ecosystem by destroying protected mangrove forest area and further resulting floods and abrasion.

The inclusion of cultural activities in coastal area is driven by spatial plans conducted before the issuance of Presidential Regulation Number 51 Year 2016 about coastal area border establishment. Tanjung Pasir Village is one of numerous villages, where its coastal area is also functioned as fisheries, tourism, and housing areas. Coastal damage in Tanjung Pasir Village is worsening by a high and rapid abrasion level, especially during 1999-2003. This situation has caused dozens of houses, trees and fields



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submerged in water due to sea flood, and sometimes when the tide is high, several houses are flooded [7]. Abrasion level in Tanjung Pasir Village is currently 1.74 hectare every year [8] and coastal line has shortened as much as 520 meters in the last 10 years [9]. Environmental damage in coastal areas is caused by domestic pollution, oil, coastal abrasion, mangrove and reefs damage. The damages in coastal area are commonly caused by human activities. Ironically, the damage has brought negative impacts towards human activities and the environment such as the damage of marine biodiversity, threats towards fishing settlements and their economic life, etc. [11].

Beach border is determined by certain range from highest coast line. In coastal area, a permanent construction foundation is not allowed to be built. Beach border utilization is a controversial act to overcome coastal danger, public usage protection, natural landscape and beaches area preservation [11]. Beach border can be utilized to protect coastal area from human activities and development project or to minimize coastal damage risks [11-13]. In beach border area, every development and building activities are prohibited and only limited to several human activities [11,14]. Coastal ecosystem protects beach border area so that its local protection function is not disrupted. Mangrove possesses ecological function as wave damper, coastal protection from abrasion and sea flood, mud barrier, and sea sediment entrapment which is carried by surface water [5,6,15,16]. The existing natural ecosystem found in Tanjung Pasir Village is a mangrove ecosystem.

According to Tangerang Regency spatial plan for year 2011-2031, Tanjung Pasir Village is a beach border area. Based on the spatial planning map, area allotment in Tanjung Pasir Village is functioned as housing and fisheries areas [17] (Figure 1).

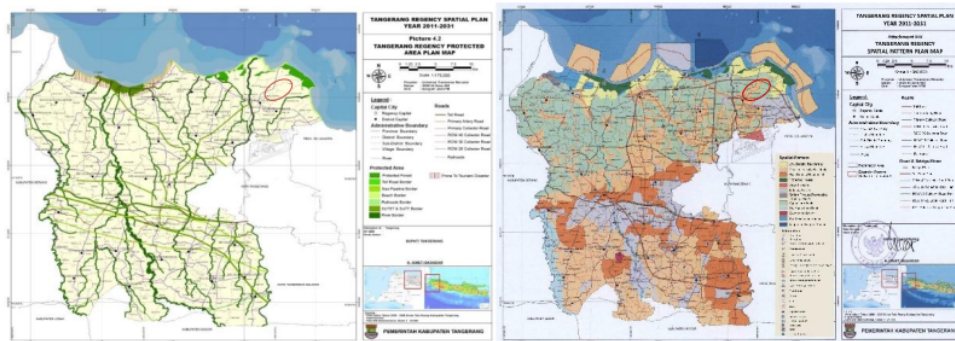


Figure 1. Spatial planning map of Tangerang regency for 2011-2031.

2. Methods

The method utilized in this research is a descriptive method. The research was conducted by mapping research area of 3.5 km along the coast line, with beach setback width of 100 m. We also identify activities in research location such as embankment, housings, tourism activities, and existing protection in research location, and analyze spatial area deviation and beach setback with Tangerang area spatial planning. This research was conducted using case study approach that included in a descriptive analysis research by using a cross-sectional research that divides research area into 4 segments. In segment 1 research area is 15.69 hectare, segment 2 is 3.44 hectare, segment 3 is 12.55 hectare, and segment 4 is 16.48 hectare.

Analysis technique utilized in this research is a spatial analysis that aims to discover and measure the width of field usage and deviated activities that deviate from spatial regulations of Tangerang Regency. Meanwhile descriptive analysis is done to describe spatial utilization in beach border areas with Tangerang Regency spatial local regulation either from its width and the type of activity, and also describing beach border area function as local protection area from its ecological, social and economic aspects.

3. Results and discussion

In spatial planning zonation guidance of beach border of Tangerang Regency, there are three typologies of activities allowed in the area, which is permissible activities, permissible activities under certain conditions, and prohibited activities [17]. Activities in beach border areas cannot disturb its function as local protected areas. The following table (Table 1), are the explanation of local protection function.

Table 1. Local protection function in beach border area.

Criteria	Variable	Indicator	Source
Local Protection Function	Ecologic	Protect the Biodiversity	Simpson M., Clarke C
		Maintenance for Coastal Ecosystem	S L M., Clarke J D, Scott D and Clarke A
		Protected from Erosion, Abrasion and Storm Surge	J [11]
		Protected from Tidal Flooding	Mercer C, Colleen S L and A J Clarke [18]
	Socio-economic	Protect the local people Community participation in coastal adaptation and restoration Protect to Economic Activity	President Law Regulation Number 51 years 2016 about Coastal Setback [2]

The result of this research reveals that there is a spatial utilization deviation in beach border area (Table 2) and the differences between spatial planning regulations of activities that are permissible, permissible under certain conditions and not permissible on the beach border and existing conditions in Tanjung Pasir Village (Table 3) that causes disruptions towards beach border area.

Table 2. Area utilization proportion comparison in beach border area.

Segmen	% Protection	% Utilization
I	0%	100%
II	40%	60%
III	0%	100%
IV	0%	100%

Table 3. Comparison between spatial planning and existing condition.

Zonation Directives	Regency Spatial Planning	Existing Condition
Permissible activities	Beach recreation, coast protection, fisheries, fishermen boat mooring, port activities, landing point cable and/or underwater piping, national defence and protection, light house, water quality controlling activities, coastal environment conservation, abrasion prevention natural and artificial structure development, beach border area protection as public space, and weather and climate observation.	Beach recreation, natural structural (mangrove ecosystem), artificial structural (<i>Breakwater</i>)
Permissible activities under certain conditions	Permissible activities under certain conditions	-
Prohibited activities	Activities that would disrupt the main local protection function and environmental quality.	Housing, Fishpond

The existence of spatial utilization deviation in beach border area, have caused disruption on local protection from ecological function, the following table lists disruptions of local protection function in beach border area.

Table 4. Disrupted local protection function.

Disrupted Local Protection Function	Segment 1	Segment 2	Segment 3	Segment 4
Ecology				
Protect the Biodiversity	X	✓	X	X
Maintenance for Coastal Ecosystem	X	✓	X	X
Protected from Erosion, Abrasion and Storm Surge	X	✓	X	X
Protected from Tidal Flooding	X	✓	X	X
Socio-Economy				
Protect the local people	X	✓	X	X
Community Participation in coastal adaptation and restoration	X	✓	X	X
Protect to Economic Activity	X	✓	X	X

annotation: ✓ = firm X =disrupted

The impact of local protection disruption caused by human activities through housing and pond fishing activities, such as littering due to inexistent garbage disposal management in the area and direct human biological waste in coastal area due to inexistent toilet facilities, plus the lack of society's awareness about the importance of coastal ecosystem which is mangrove forest in protecting local area from coastal damages. Community Participation in coastal adaptation and restoration.

Deviation of Tangerang Regency spatial planning with the existing condition in coastal area of Tanjung Pasir Village, have caused disruption on local protection function. The government needs to conduct spatial planning review. The review should be able to specify the conditions for cultivation activities in beach border area. Area utilization guidance drafting should accommodate Presidential Regulation Number 51 Year 2016 regarding Beach Border Line. Beach border area planning should follow earthquake and/or tsunami protection regulation, abrasion and erosion protection, artificial resource protection such as mangrove ecosystem, reefs, estuary and delta, public access, sanitation, and waste control.

Conclusion

Spatial utilization deviation in beach border area of Tanjung Pasir Village can be seen by the existence of protection and cultivation activities. Cultivation activities in segment 1 reaches 100%, segment 2 reaches 60%, segment 3 reaches 100%, and segment 4 reaches 100%. Segment 2 is the only segment where protection function exists. There are several prohibited activities found which deviate from beach border spatial utilization area of Tangerang Regency such as housing and pond fisheries. Local protection function in segment 1, segment 3 and segment 4 are disrupted due to ecological, and socio-economic aspects.

Acknowledgm¹³

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