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Original research article

Suitability of Coral Reef Rehabilitation Sites in the Coastal Waters of Tanjung Siangau, West Bangka Regency

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ABSTRACT

Land clearing for mining operations can potentially cause severe damage to coastal and marine environments. Restoration of post-mining areas can be addressed through closure and recovery efforts, particularly via coral reef rehabilitation. This study aims to determine site suitability for coral reef rehabilitation or marine reclamation in the waters of Tanjung Siangau. Conducted in August 2023, the study used a multi-parameter map overlay method to produce a suitability map for reef rehabilitation. Parameters considered include bathymetry, turbidity, current velocity, wave conditions, substrate type, reef exposure, protection status, proximity to coral donor sources, community involvement, and marine spatial zoning. Findings indicate that areas damaged by coastal and marine activities require reclamation, including coral rehabilitation. Reclamation of post-mining lands must adhere to Indonesian Law No. 3 of 2020 and The Mineral and Energy Resource Ministerial Regulation No. 26 of 2018. Overlay results revealed the highest suitability score in the southern waters of Tanjung Siangau, an area categorized as moderately damaged coral cover (<50%). Local community reports indicate that this area is not mined due to the absence of tin deposits. The recommended site for coral reef rehabilitation lies outside of any licensed mining concession and is situated within an Underwater Tourism Zone in accordance with the Coastal and Small Islands Zoning Plan (RZWP3K).

Introduction

Tin mining activities in the Bangka Belitung Islands of Indonesia have led to significant environmental degradation,

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particularly impacting coastal ecosystems and disrupting the livelihoods of local fishers (Adi, 2012; Adi et al., 2024; Nurtjahya et al., 2017; Nurtjahya & Agustina, 2015). In response, the Government of Indonesia has implemented environmentally oriented mining regulations, most notably through the Ministerial Regulation of the Ministry of Energy and Mineral Resources (ESDM) No. 26 of 2018 and ESDM Decree No. 1827K/30/MEM/2018. These regulations mandate that holders of mining business permits (Izin Usaha Pertambangan, IUP) are required to submit, implement, and report on both reclamation and post-mining plans. In cases where production activities occur offshore, the reclamation plans must include key actions such as biodiversity conservation.

Despite regulatory frameworks, offshore tin ore mining continues to adversely affect seawater quality, a critical concern given the ecological sensitivity of coastal areas and the reliance of local communities on these waters for subsistence and income (Adi, 2012; Adi et al., 2024; Adibrata et al., 2021). Healthy marine ecosystems are particularly dependent on clear water conditions, which facilitate light penetration, enhance photosynthesis, and promote the diffusion of dissolved oxygen—conditions vital for sustaining aquatic life (Asih et al., 2022; Syari et al., 2019). The assessment of seawater quality and sedimentation rates in such contexts is typically benchmarked against the Indonesian Marine Water Quality Standards as stipulated in Minister of Environment Decree No. 51 of 2004, with sedimentation monitoring guided by Decree No. 37 of 2003.

To support biodiversity conservation, IUP holders are required to undertake rehabilitation efforts, which commonly include the installation of artificial coral reefs. However, when these activities are conducted in areas that are still undergoing active mining operations, their success rates are significantly diminished (Ferizal et al., 2024; Koroy et al., 2020). Rehabilitation efforts are more likely to succeed when implemented in regions with minimal anthropogenic disturbances (Prabowo et al., 2023). Despite the critical importance of spatial suitability, dedicated studies assessing optimal locations for marine rehabilitation have yet to be conducted and are urgently needed to ensure effective and targeted interventions.

This study seeks to support private sector (IUP holders) initiatives by providing a scientific basis for marine rehabilitation planning. Specifically, it aims to assess the ecological suitability of the Tanjung Siangau coastal waters for coral reef rehabilitation as part of broader marine reclamation strategies. The findings are intended to contribute to spatial planning efforts that enhance the sustainability of post-mining restoration practices in offshore tin mining areas.

Materials and Methods

Time and place

This research was conducted in August 2023 in the Tanjung Siangau coastal waters, West Bangka Regency (Figure 1).

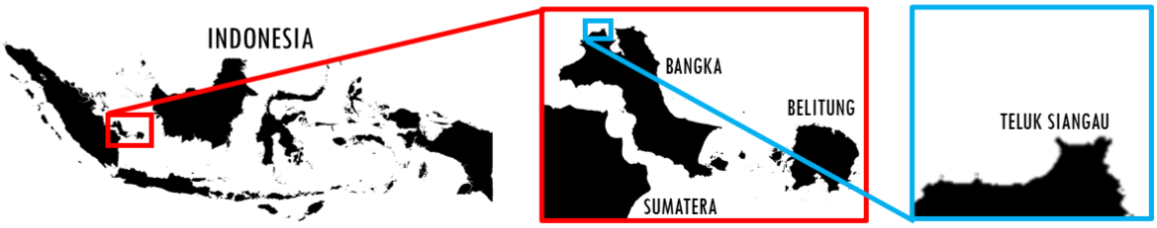

Figure 1. Research Location in Teluk Siangau, Islands Province of Bangka Belitung, Indonesia.

Sampling and Data Collection Methods
Bathymetry or Water Depth

Water depth data were obtained using a Garmin 585 Plus single-beam echosounder and were integrated with nautical chart data. Prior to survey execution, survey lines were planned in zigzag, straight-line, or concentric-circle configurations. Digital bathymetric models were developed through interpolation of depth points collected during the survey (Siregar & Selamat, 2009). Depth measurements were corrected to Mean Sea Level and adjusted to Chart Datum to establish a standardized sea level baseline (Adibrata, 2007). Tidal corrections were also applied for accurate depth values (Shofian et al., 2019).

Turbidity

Turbidity data were derived from both in-situ measurements and satellite imagery (Sentinel L2A), which aided in visualizing turbidity distribution in the study area.

Current Direction and Velocity

Current data were obtained through two approaches: (1) direct field measurement, and (2) hydrodynamic modeling from Copernicus Ocean Viewer. The velocity was calculated by dividing the length of the current drogue string by the time taken, while current direction was determined using a geological compass. The field measurement was determined for sea water current as V, rope length as S, and time travel of current drogue as t follows the following formula (Riandi et al., 2022).

$$V = s/t$$

Data were processed using ArcGIS 10.4 to generate current direction and velocity maps (Ma'arif & Hidayah, 2020). According to Sese et al., (2018), current speeds were categorized as: very fast (>1 m/s), fast (0.50–1 m/s), moderate (0.25–0.50 m/s), slow (0.10–0.25 m/s), and very slow (<0.10 m/s).

Sea waves

Wave height categories follow the World Meteorological Organization (WMO) Sea State Code: 0.50–1.25 m (slight), 1.25–2.50 m (moderate), and 2.50–4.00 m (rough). The suitability of sea waves for coral reef rehabilitation refers to the method proposed by Tanamal et al., (2019) that the most suitable areas for coral rehabilitation are those with slightly wavy conditions. Moderate waves facilitate the movement of nutrient-rich currents, beneficial to the growth of raised corals. However, excessively strong waves may displace artificial substrates, damaging newly transplanted corals.

Substrate Type

Biotic benthic surveys used underwater cameras in depths exceeding 10 meters to maximize efficiency. Coral reef data collection followed the protocol by English et al., (1998). In shallower waters (<10 meters), Self-Contained Underwater Breathing Apparatus (SCUBA) diving was used, guided by Sentinel L2A imagery to identify reef and seagrass beds. The suitability of substrate types based on highest score of hard corals. According to Tanamal et al., (2019), hard substrates (rock, dead coral, rubble) were scored highest for coral rehabilitation suitability. Sites with live coral cover <50% and higher proportions of dead coral and rubble less than 50% (damage) were deemed appropriate for rehabilitation.

Substrate type was assessed using underwater cameras and sediment samples collected via Ekman grab. Sediment types were documented and analyzed to determine bottom conditions.

Reef Slope

Reef slope (reef flat) inclination, according to Lesmana et al., (2021) is categorized into several types: flat (0–8%), gentle (8–15%), moderately steep (15–25%), steep (25–45%), and very steep (>45%). The percentage of reef slope was derived from the analysis of depth contour data (bathymetry), which was then reclassified in the study by Tanamal et al., (2019) into suitability scores for coral reef rehabilitation.

Protection Level

According to Santoso & Kardono (2008) that open water areas receive adequate food and oxygen supply, while enclosed zones inhibit coral growth. Suitable rehabilitation sites are thus characterized by relatively open marine conditions.

Distance to Coral Donor Sites

Successful coral transplantation or bio-reeftek (using coconut shells) requires proximity to donor corals. Based on Tanamal et al., (2019) distances were categorized as <100–300 m, 300–500 m, and >500 m. In practice, coral donors should be sourced from the nearest accessible healthy reef. However, the distance of coral donors is relatively difference in each site that is recommended to utilize a close donor or most available to be transported into the rehabilitation sites.

Site Suitability Assessment for Coral Reef Rehabilitation

The site suitability scoring system was adapted from Ramses, (2015); Razak et al., (2022); Tanamal et al., (2019) (Figure 2). Furthermore, scoring of the site suitability is modified from (Ramses, 2015; Razak et al., 2022; Tanamal et al., 2019). This modification is expected to build a more complex coral reef rehabilitation site suitability scoring incorporating physical, chemical, and biological parameters (Tanamal et al., 2019), along with community involvement and marine spatial zone synchronizing (Ramses, 2015) (Table 1).

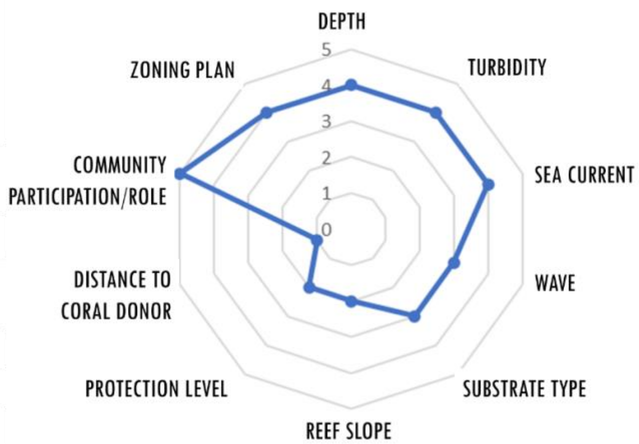

Figure 2. Parameters Weight in Coral Reef Rehabilitation Suitability Index (CRSI). Modified from Ramses, (2015); dan Tanamal et al., (2019)

Table 1. Site suitability scoring matrix for Coral Reef Rehabilitation Suitability Index (CRSI), modified from Ramses, (2015); dan Tanamal et al., (2019)

PARAMETERS	WEIGHT	MOST SUITABLE (S1)		SUITABLE (S2)		LESS SUITABLE (S3)	
		CLASS	SCORE	CLASS	SCORE	CLASS	SCORE
Depth (m)	4	2-7	3	>7-15	2	<2 or >15	1
Turbidity	4	Low (sediment free)	3	Medium (slight turbid)	2	High (Turbid)	1
Sea current (m/s)	4	0.3-0.4	3	0.1-0.3	2	<0.1	1
Wave (m)	3	Slightly wave	3	Less wave	2	Calm and High waves	1
Substrate Type	3	Hard (Rock, Dead Coral, Rubble)	3	Moderately Soft (Rubbles and sand)	2	Soft (sand and mud)	1
Reef Slope	2	Relatively flat (slope 0-15%)	3	Slightly step (slope >15-25%)	2	Step (slope >25%)	1
Protection Level	2	Relatively open	3	Sufficiently sheltered	2	Protected	1
Distance to Coral Donor (m)	1	<50	3	50-75	2	>75	1
Community participation/role	5	Recommended location for community uses	3	Recommended location	2	Community-designated unsuitable area	1
Zoning plan	4	Tourism zone, Conservation Zone	3	Zones excluding mining, industrial, conservation, and tourism purposes	2	Zone for mining, industry, and cable routes	1
Total Weight x Score			96		64		32

A Coral Reef Rehabilitation Suitability Index (CRSI) was calculated using the formula as follows (Tanamal et al., 2019):

$$CRSI = (\Sigma(Ni \times Bi) / Nmaks) \times 100\%$$

The CRSI was determined using a scoring system wherein Ni represents the score assigned to each parameter, Bi denotes the weight of each parameter, and Nmaks refers to the maximum possible score. The resulting total score was then expressed as a percentage of the maximum possible score and categorized into three suitability classes: S1 (Highly Suitable) for scores exceeding 75% up to 100%, S2 (Suitable) for scores ranging from 50% to 75%, and S3 (Not Suitable) for scores below 50%. This classification framework enables a standardized evaluation of suitability levels based on weighted parameter scores, facilitating comparative analysis across different study sites or scenarios.

Results and Discussion

Marine mining operations have the potential to induce irreversible environmental degradation and contamination. Given the protracted recovery period associated with such impacts, remediation efforts through reclamation are imperative. Reclamation of natural terrestrial environments for general purposes is governed by Law of the Republic of Indonesia No. 27 of 2007, while reclamation of post-mining landscapes is regulated under Law No. 3 of 2020 and the Ministry of Energy and Mineral Resources Regulation No. 26 of 2018. Subsequently, the evaluation of reclamation suitability relative to pertinent environmental and technical parameters is outlined as follows:

Depth

Bathymetry, or the topography of the seafloor, refers to the measurement of the elevation and depression of the seabed, serving as a primary source of information regarding underwater terrain (Anzari et al., 2017). Changes in hydrographic conditions within marine and coastal waters are influenced by natural factors as well as anthropogenic activities such as land use in the area. Bathymetric mapping is therefore fundamental and essential for effective coastal zone management (Bobsaid & Jaelani, 2017).

Bathymetric depths in the coastal areas extending seaward generally range from 0 to 50 meters. The contour density observed on the bathymetric map indicates a gentle slope in the coastal zone and relatively deeper waters offshore when compared to the depths found in the central and southern parts of Bangka Island. The suitability of depth for coral reef rehabilitation follows the guidelines of Tanamal et al., (2019) which suggest that the most appropriate areas for coral reef rehabilitation are located close to the coastline of Bangka Island.

Turbidity

Total Suspended Solids (TSS) refer to particulate matter suspended in water that remains afloat without settling to the bottom of the water body (Pamungkas & Husrin, 2020). he concentration levels of TSS are influenced by inputs from terrestrial runoff and riverine flows. Laboratory analyses yielded the TSS parameter values representing water turbidity, which are presented in Table 2.

Table 1. Parameters of Total Suspended Solids (TSS)

No	Coordinates	Results	Unit	Methods
1	105.539706E, 1.556047S	34	mg/l	SNI 06-6989-3-2004
2	105.536141E, 1.559829S	57	mg/l	SNI 06-6989-3-2004
3	105.558254E, 1.538374S	87	mg/l	SNI 06-6989-3-2004
4	105.558006E, 1.540509S	57	mg/l	SNI 06-6989-3-2004
5	105.567059E, 1.527465S	262	mg/l	SNI 06-6989-3-2004
6	105.565545E, 1.526993S	276	mg/l	SNI 06-6989-3-2004

The waters north of Bangka Island are not free from sedimentation, given that this area is an active mining zone. The assessment of turbidity suitability for coral reef rehabilitation indicates that the highest suitability score is 2, corresponding to areas located approximately 4 miles from the coastline (see Figure 3).

Sea Current

Indonesian waters are influenced by monsoonal winds, which are categorized into two primary phases: the east monsoon (June–August) and the west monsoon (December–February). During the east monsoon, winds blow from the Asian continent toward Australia, whereas during the west monsoon, the wind direction is reversed—from Australia to Asia (Purba, 2014). These seasonal wind patterns also affect current flows around Bangka Island, situated between the Natuna Sea and the Java Sea, both of which lie along monsoonal wind paths (Setyawan & Pamungkas, 2017).

Current velocities in the study area ranged between 0.12 m/s and 0.33 m/s, predominantly flowing southwestward (237.79°). According to Sese et al., (2018), these velocities are classified as slow to moderate. Current direction in the study area is influenced by the east monsoon winds. Current models from the Copernicus Ocean Viewer (COV) revealed that surface current velocities at coordinates 1.408°S and 105.439°E during 2021–2023 reached their lowest in April–May (average 0.05 m/s), and highest in July–August (average 0.10 m/s). Based on Tanamal et al., (2019), coastal current suitability (<4 nautical miles) for coral reef rehabilitation in this location received a suitability score of 2 (see Figure 3).

Waves

Sea waves are the vertical oscillatory motion of water forming sinusoidal curves, primarily generated by wind action (Kurniawan et al., 2011; Wiguna et al., 2020). Wave analysis using the Copernicus Ocean Viewer showed wave heights reaching 0.40 m, which is classified as slight sea. Historical wave height data from 2021–2023 indicate that higher waves occurred between December and February (ranging from 0.60 to 0.80 m). According to BMKG data for early January 2023 (4–10 January), wave heights in northern Bangka waters ranged from 0.50 to 1.25 m, also categorized as slight sea. Overall, the wave heights in northern Bangka waters ranged between 0.10–0.50 m, and in the south between 0.10–0.30 m. Waves exceeding 2 m typically originated from the southeast, east, and north (Pamungkas, 2018). The wave suitability for coral transplantation in this study was categorized as moderate, with a suitability score of 2 (see Figure 3).

Substrate Type

Benthic observations, including diving surveys, were conducted to assess coral reef and seagrass presence. Coral reefs were identified nearshore, whereas seagrass beds were not observed (Table 3).

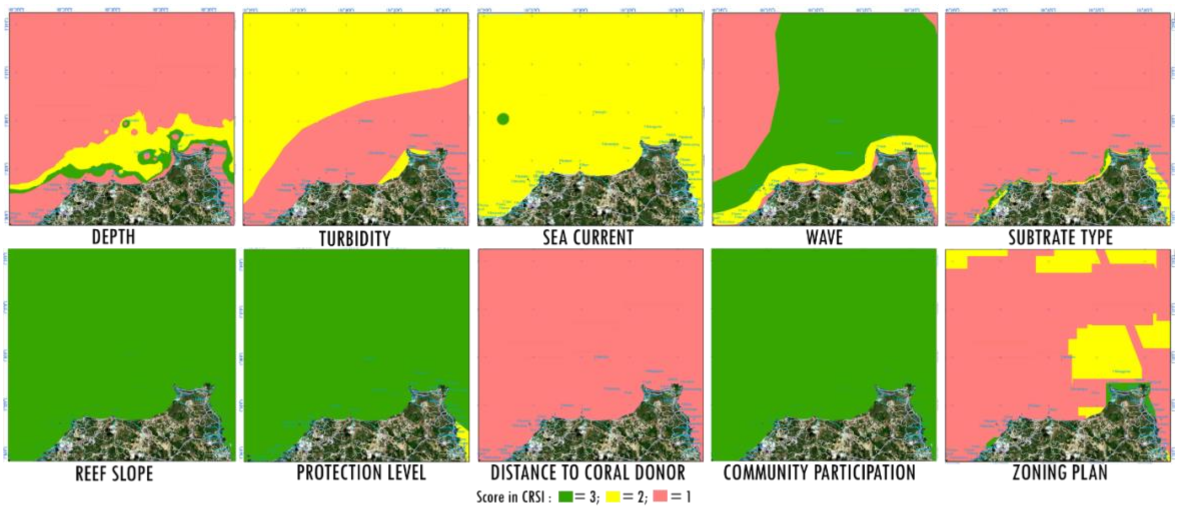

Figure 3. Parameters Scoring for CRSI

Table 2. Field Observation of Coral Reefs

Spots of coral reef monitoring	**(a)**	**(b)**
Position of coral reefs towards proposed sea mining	Located in southeastern heading to south (Pantai Tanjung Siangau Waters), situated in distance of 8.30 km from the sea mining concession location.	Located in southeastern heading to south (Pantai Tanjung Siangau Waters), situated in distance of 7.74 km from the sea mining concession.
Time and coordinate	10:27 AM 105.534883E, 1.561982S	09:21 AM 105.557854E, 1.538697S
Methods of coral reef monitoring	*Manta Tow,* Based on English et al., (1998)	*Line intercept transect* (LIT), Based on English et al., (1998)

Spots of coral reef monitoring	(a)	(b)
Percent cover of live corals	16,67%	40,7%
Score criteria of coral damages percentage (referring to The Decree of Indonesian Environmental Ministry No. 04 of 2021	Poor (Damage)	Poor (Fair)
Coral life form types	-	9 species
Water depth during field observation	1 m	In average of 3 m, and in maximum of 4.3 m
Biotic components in coral reef ecosystem	Macro algae (*Padina australis*), Fish *Neoglyphidodon nigroris* & *Halichoeres javanicus*, dan Seawater lily (*Crinoidea*)	Sea urchins (*Diadema setosum*), fish *Chelmon rostratus*, *Neoglyphidodon nigroris, Caesio cuning, Siganus virgatus* & *Scarus rivulatus*

Substrate suitability for coral reef rehabilitation received the highest score (3) in coral reef areas. The analysis showed that among hard coral types, the live coral cover did not exceed 50%, while the values for dead coral and rubble were above 50%. Areas with live coral cover of less than 50% are considered degraded and suitable for coral reef rehabilitation.

The seabed profile in the proposed area and its surroundings consists of Silty Gravelly Sand, Gravelly Sand, and Sandy Silt. These findings are based on sediment grain size analysis following the Folk (1980) classification, as mapped by the Center for Marine Geological Development in the 1996 Seabed Sediment Distribution Map.

Reef Slope

The contour data analysis from the bathymetric map indicated a dominant slope value of 1%. This gently sloping seabed condition is commonly found along the coast of Bangka Belitung. The suitability of reef slope for coral rehabilitation corresponds to areas with relatively flat terrain (equivalent to land slope values of 0–15%). The reef slope suitability analysis is based on depth contours from bathymetric maps (see Figure 3).

Protection level

The proposed reclamation site is located on a cape, characterized by relatively open waters. Open marine areas are favorable for coral growth due to better food and oxygen availability, whereas enclosed areas hinder coral development. All observed sites were classified as highly suitable in terms of protection level (see Figure 3).

Distance to coral donor sites

Field measurements (August 11–27, 2023) showed live coral cover of 16.67% and 40.7% at the observation points—categorized as "damaged” (poor and middle, respectively). Studies by Syari, et al., (2022), dan Siringoringo & Hadi, (2013) in Pemuja dan Karang Malang Duyung suggest that coral reef degradation is linked to mining-induced sedimentation. It is due to high mud score and the transplanted coral reefs adjusted to coastal sea-mining activity.

The current research has identified nine coral lifeforms including Acropora Digitate (ACD), Coral Encrusting (CE), Coral Folliose (CF), and Coral Massive (CM), Coral Submissive (CS), Macro Algae (MA), Dead Coral Algae (DCA), Sand, and others. Associated fauna included various reef fishes (*Neoglyphidodon nigroris, Halichoeres javanicus, Chelmon rostratus, Caesio cuning, Siganus virgatus, dan Scarus rivulatus*), other invertebrates such as seawater lily *Crinoidea* and sea urchin (*Diadema setosum*) as well as macro algae like *Padina australis*.

Given the degraded condition of the coral reefs, active rehabilitation interventions are deemed necessary. Specific rehabilitation efforts, such as coral transplantation or bioreeftek methods (e.g., using coconut shell structures), require sourcing donor coral fragments from nearby healthy reef areas. According to Syari et al. (2022), the nearest suitable donor reef is located approximately 12 km away in the waters surrounding Malang Duyung Island. This site exhibits favorable reef conditions, classified as "Good", with live coral cover reaching 69.17%, thereby making it an appropriate source for donor corals. Furthermore, the suitability analysis of the donor coral distance, which incorporated both prior research and recent field surveys, revealed a low suitability score for the study area. This outcome is attributed to the substantial distance—approximately 12 km—between the target rehabilitation site (live coral cover <50%) and the nearest suitable donor site (live coral cover >50%).

Community Role and Participation

Community engagement in coral reef rehabilitation efforts is expected to be twofold. First, local residents are envisioned as active participants in the rehabilitation process itself. Second, they stand to benefit from the outcomes of such initiatives. These benefits may include increased fish abundance associated with healthy coral habitats, opportunities to enhance household income by serving as guides for marine ecotourism, and the potential to transition from tin mining to livelihoods aligned with marine conservation and tourism.

During the public consultation on coral reef rehabilitation held on September 8, 2023, community members expressed general support for the initiative. The preferred rehabilitation sites were those located near existing coral reefs and that could be integrated with underwater tourism zones. Survey responses collected through questionnaires were subsequently analyzed to determine rehabilitation site suitability based on community role and participation.

Marine Spatial Allocation in the Zoning Plan

Marine spatial suitability refers to the alignment between proposed marine utilization activities and the official spatial and/or zoning plans. In the Bangka Belitung Islands Province, all marine activities must comply with the Coastal and Small Islands Zoning Plan (RZWP3K), as stipulated by Bangka Belitung Provincial Regional Regulation No. 3 of 2020 (see Figure 3). According to the RZWP3K map, the proposed mining area falls within a designated mining zone. Adjacent zones include marine tourism, aquaculture, capture fisheries, and submarine cable routes. The mapped marine corridors also include telecommunications cable pathways and sea turtle migration routes. Although no sea turtles were observed during the field survey, dolphins were recorded passing through the area. These designated corridors require ongoing attention from the company to ensure that marine life and underwater infrastructure (e.g., cables) are not adversely affected. Regular monitoring of both the water column and seabed is recommended to uphold ecological and operational integrity.

Marine spatial suitability for coral reef rehabilitation is illustrated in the map (Figure 3). The most suitable areas for rehabilitation are located within the designated tourism zones, specifically underwater tourism areas. Synchronizing an integrated coral restoration effort—such as coral transplantation—into these zones can enhance the aesthetic and ecological value of the underwater environment, making it more attractive to visitors. There is significant potential for utilizing local fishing vessels for tourism-related activities, especially given the current lack of dedicated tourism boats in the region. This opportunity can help improve the livelihoods of fishers and other community members by enabling a transition from extractive industries, such as tin mining, to sustainable livelihoods in marine tourism.

Site Suitability of Coral Reef Rehabilitation

Site suitability for coral reef rehabilitation was assessed using the Coral Reef Suitability Index (CRSI). The results of the multi-parameter overlay analysis are presented in the coral rehabilitation suitability map (Figure 4).

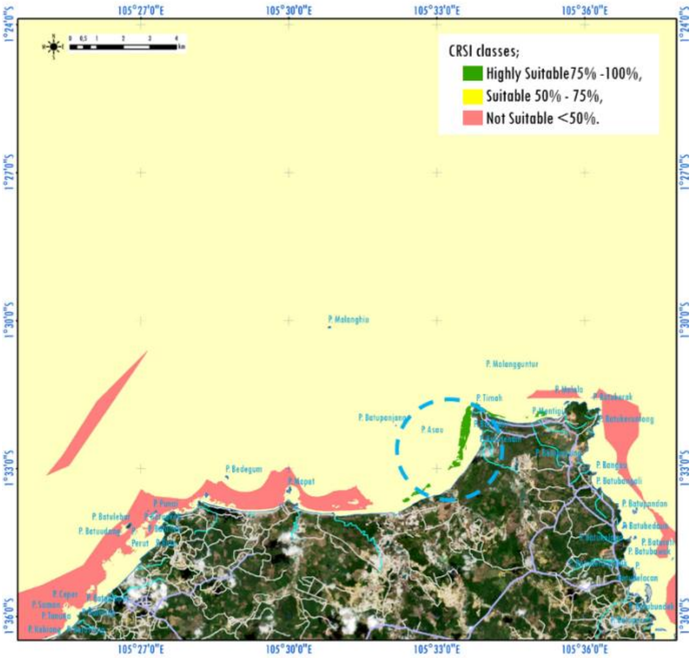

Figure 4. Map of Rehabilitation Suitable Area of Coral Reefs (Recommended location shown in blue dash line).

The most suitable area for coral reef rehabilitation is indicated by the blue dashed circle on the map. This location lies to the south of Tanjung Siangau and is classified as moderately damaged, with live coral cover below 50%. According to local community accounts, this area is unlikely to be targeted for mining, as there are no tin deposits present on the seabed. The suitability assessment integrates multiple parameters, including water depth, turbidity, current velocity, wave conditions, substrate type, reef slope (exposure), level of protection, proximity to coral donor sources, community involvement, and alignment with marine spatial zoning under the RZWP3K. This suitability assessment takes into account various parameters, including water depth, turbidity, current velocity, wave characteristics, substrate type, reef slope (exposure), site protection, distance to coral donor sources, community participation, and spatial alignment with marine zoning regulations (RZWP3K).

The recommended site for coral reef rehabilitation lies outside the designated Mining Business Permit (IUP) area. Ongoing mining activities in proximity to rehabilitation zones can negatively impact restoration outcomes and reduce site suitability. The highest suitability score was identified in the coral reef area located south of Tanjung Siangau, which falls within the

Underwater Tourism Zone as defined by the RZWP3K.

Conclusion

Degradation in coastal and marine areas necessitates remedial action in the form of reclamation, including coral reef rehabilitation. Reclamation activities on natural land for public use are regulated under Indonesian Law No. 27 of 2007, whereas reclamation of post-mining sites is governed by Law No. 3 of 2020 and Indonesian Ministry of Energy and Mineral Resources Regulation No. 26 of 2018. The formulation of reclamation suitability criteria for coral reef rehabilitation sites incorporates multiple parameters: bathymetry or water depth, turbidity, current velocity, wave conditions, substrate type, reef slope (exposure), degree of protection, distance to coral donor sources, community involvement, and marine spatial zoning. Overlay analysis of these parameters identified the southern region of Tanjung Siangau as having the highest suitability score for coral reef rehabilitation following mining activities. This area is classified as moderately damaged, with live coral cover below 50%. According to local community information, the area is not subject to mining due to the absence of tin deposits in the seabed. The recommended rehabilitation site lies outside the designated Mining Business Permit (IUP) zone. Furthermore, this location falls within the Underwater Tourism Zone of the Coastal and Small Islands Spatial Plan (RZWP3K), making it a highly suitable candidate for rehabilitation efforts.

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