

COMMUNITY PERCEPTION OF CORAL REEF DAMAGE CAUSED BY THE IMPACT OF MAINLAND COASTAL DEVELOPMENT ACTIVITIES

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ABSTRACT

The main land coastal development activities (Makassar City and its surroundings) have direct and indirect impacts on the community and the environment, especially fishermen who catch fish on the coral reefs of the Spermonde Archipelago. These activities include sea sand extraction and beach reclamation for the construction of ports and waterfront cities. The perceived impact consists of positive and negative values. This study aims to analyze the community perception of coral reef damage caused by the impact of mainland coastal development activities in Makassar City and its surroundings. This research was conducted from October to November 2021 on Barrang Caddi Island, Badi Island and Bontosua Island, Spermonde Archipelago. This research is classified as ex post facto with descriptive quantitative survey method. Respondents in this study as many as 200 people who make a living as fishermen. Determination of informants is done by stratified random sampling method. The measurement of the degree of perception is measured by the Likert scale method. The results of the study indicate that the positive value impacts are to provide security from the crime of illegal fishing, and the community gets a side job, namely the activity of rehabilitating coral reefs. The negative value impacts are the disruption of local wisdom, the increase in environmental pollution, the decrease in the number of fish catches, as well as higher fishing operational costs incurred. To manage public perception, it is necessary to manage the impact of development and community empowerment in a sustainable manner.

Keywords: Human behavior, marine ecosystem, coastal development, Spermonde Archipelago.

1) INTRODUCTION

Environmental issues have ramifications for coastal and ocean life. Ecosystem damage, particularly to coral reefs, is caused by a variety of human activities, including coral mining, fishing with explosives, poisonous compounds, and fishing gear. However, it is also caused by water pollution from domestic, agricultural, and industrial waste from land-based activities as well as at sea (marine-based activities), siltation and sedimentation due to soil erosion on land, mining, abrasion, and coastal reclamation on the coast and in the ocean, and siltation and

sedimentation due to soil erosion on land, mining, abrasion, and coastal reclamation on the coast and in the ocean (Yusuf & Moore, 2020).

Sea sand mining in Galesong, beach reclamation for the waterfront city Center Point of Indonesia, and the construction of New Port Makassar, as well as commercial and industrial activities on the coast of Makassar City, are all activities that have a significant impact on life in the Spermonde Archipelago. This is an essential initiative that contributes to its success, and its implementation has a good impact on regional progress as well as the income of coastal communities, particularly fishermen (Stacey, et al. 2021).

An area in which infrastructure is being built through boosting the community's ability to manage natural resources and expanding access to production, which promotes economic growth (Purnomo, et al. 2021). Infrastructure is linked to social welfare and environmental quality in a region's economic growth process. As evidenced by the evidence, areas with better infrastructure systems have higher levels of social welfare, environmental protection, and economic growth (Bashir, et al. 2021).

However, the construction of this infrastructure has an impact on community attitudes and the presence of disturbance, notably among fishermen. Fishermen's perspectives include a decline in fish catches, increased waste, oil spills, muddy seas, and coral damage, according to Witro & Yanti (2021), implying that fishermen must go long distances to catch fish.

The purpose of this study was to examine public perceptions of development activities on the coast of Makassar City (and its environs), which have repercussions for the livelihoods of fishermen on small islands in the Spermonde Archipelago. Knowing the public perception index becomes a control tool for monitoring and evaluating the impact of development, allowing key parties to manage environmental impacts and reduce community unrest.

2) METHODS

This study took place between October and November 2021 on Barrang Caddi Island, Badi Island, and Bontosua Island in the Spermonde Archipelago as a sampling region to determine community perceptions of the influence of coastal development in Makassar City and its environs. The following factors influenced the choice of this research location: 1) conditions of coral reef ecosystem damage that had an impact on fish catches (Rauf & Yusuf, 2004; Septian, 2018); 2) the existence of a coral reef ecosystem rehabilitation program, which is a form of CSR activity; and 3) despite being located on small islands, transportation and communication are easy.

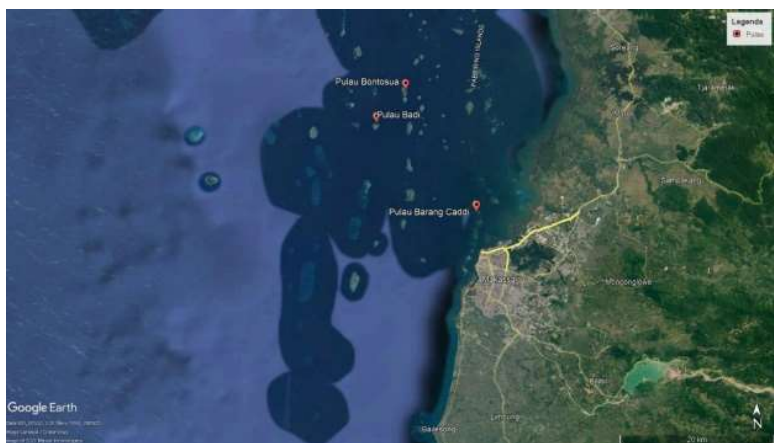


Figure 1: Location of research

The respondents were chosen based on the community's characteristics, the majority of them are traditional fisherman who rely on it for their livelihood. This study uses a descriptive quantitative survey method and is categorised as ex post facto. In addition, respondents were chosen using a stratified random sample procedure that was disaggregated by age, specifically those over the age of 17. In Singarimbun & Effendi (1989), the Slovin formula (1960) was used to determine the number of samples, namely:

$$n = \frac{N}{N.d^2 + 1}$$

n = The quantity of samples

N = The total population

d² = Set the bar for accuracy.

In this investigation, the accuracy was fixed at 10%. The total population was calculated using data from the 2020 census. The total number of research participants is 200, with information on each island shown in Table 1.

Table 1. The details of each island's research samples

No.	Name of the island	Total population (families)	Quantity of samples (families)
1	Barrang Caddi Island	315	76
2	Badi Island	110	52
3	Bontosua Island	255	72
	Total	680	200

Data was gathered through the use of interview procedures, such as interview guides and questionnaires. To describe fishermen's perceptions of the impact of coastal development in Makassar City and its environs, a Likert scale calculation was utilized. This analysis is used to assess a person's or a group's attitudes and perceptions of social phenomena. Variable indicators are created from the variables to be measured. The indicator variable is then utilized as a jumping off point for creating instrument items, which can be questions or assertions (Umar, 2011). The following is the formula:

$$\text{Index (\%)} = \frac{Y}{\text{Total Score}} \times 100$$

Y = Score of the indicator (Likert Scale x number of respondents who voted)

Total score = All responders' total indicator score

The following is the weight of the Likert Scale assessment (Umar, 2011).

Table 2. The importance of the Likert Scale evaluation

Score	Code	Description
5	SA	Strongly agree
4	A	Agree
3	N	Neutral
2	D	Disagree
1	SD	Strongly Disagree

Using a questionnaire as a data collection tool. Questionnaires are written questions that research respondents will answer in order for researchers to acquire field data in order to solve research problems that arise in the field (Supardi, 2015:127). The answers of these respondents can be given a weighted value or a Likert score in quantitative form for questions asked using a Likert Scale.

3) RESULTS

The goal of this study is to examine the community's perceptions on the social, economic, and environmental impacts of Makassar City's coastal development and its environs, which have implications for the livelihoods of fishermen on small islands in the Spermonde Archipelago.

Table 4. The community's perceptions on the social impacts of coastal development

No.	Statement	Indicator	Score	Perseption Index (%)
1	Due to coastal development, public awareness of coral reef sustainability is growing.	SA	30	5,94
		A	124	24,55
		N	168	33,27
		D	152	30,10
		SD	31	6,14
2	Public safety from illegal and damaging fishing.	SA	165	23,44
		A	320	45,45
		N	159	22,59
		D	52	7,39
		SD	8	1,14
3	After coastal development, the community's wisdom is retained in maintaining coral reefs.	SA	20	5,45
		A	40	10,90
		N	75	20,44
		D	142	38,69
		SD	90	24,52

The perception index that public awareness of coral reef preservation is increasing due to coastal development is 33,27% neutral conditions, 45,45% of perceptions agree that public safety is from destructive fishing and illegal fishing, and 38,69% of perceptions disagree that the community's local wisdom is maintained in preserving coral reefs after coastal development.

Table 5. The community's perceptions on the economic impacts of coastal development

No.	Statement	Indicator	Score	Perseption Index (%)
1	With coastal development, fishermen's income from reef fish captures rises.	SA	0	0,00
		A	40	10,84
		N	69	18,70
		D	186	50,41
		SD	74	20,05

2	In the form of CSR to rehabilitate coral reefs, a side work area is provided as a supplementary source of income for the neighboring community.	SA	215	28,94
		A	320	43,07
		N	186	25,03
		D	14	1,88
		SD	8	1,08
3	Fishermen's operational costs for catching fish have dropped as a result of coastal development.	SA	15	4,21
		A	20	5,62
		N	39	10,96
		D	206	57,87
		SD	76	21,35

According to the study's findings, 50,41% of perceptions disagree that fishermen's income from reef fish catches increases with coastal development, while 43,07% agree that side work is an additional source of income for the surrounding community in the form of CSR to rehabilitate coral reefs. Since the coastal development, the notion of operating costs utilized by fisherman to obtain fish has dropped, with 57,87% disagreeing.

Table 6. The community's perceptions on the environmental impacts of coastal development

No.	Statement	Indicator	Score	Perseption Index (%)
1	Coastal development has no negative impact on water or air quality.	SA	35	7,95
		A	36	8,18
		N	138	31,36
		D	186	42,27
		SD	45	10,23
2	Coral reefs are not directly harmed by coastal development.	SA	15	3,03
		A	88	17,78
		N	240	48,48
		D	114	23,03
		SD	38	7,68
3	Coastal development has no effect on the morphology of the coast.	SA	15	2,93
		A	108	21,09
		N	219	42,77
		D	146	28,52
		SD	24	4,69

The perception index that coastal development does not cause a decrease in water and air quality is 42,27%, indicating that the perception does not agree, while the perception that coastal development does not cause direct damage to coral reefs is 48,48% neutral, according to the research findings. Similarly, 42,77% believe that coastal development does not produce morphological changes to the coast.

4) DISCUSSION

Community perceptions on the social impact of coastal development in Makassar City and its environs that still need to be managed, notably the community's local wisdom in maintaining coral reefs when coastal development is not maintained. According to Utina's (2012) research on ecological intelligence in community local wisdom, human perception of nature and the form of human conduct are shaped by the community's proximity to its ecological elements. Traditional ecological values, attitudes, and behavior in the living order of local communities shape a society's ecological intelligence. For example, in coastal communities, this local value has proven to be highly useful in managing natural resources and attempts to maintain ecosystems.

Development efforts, according to respondents, have damaged fish livelihoods that were previously considered sacred and kept hidden. The noise from boats travelling back and forth and dredging sand for reclamation purposes is the source of the issue. Furthermore, the advancement of coastal development and the management of sea channel zones have transformed fishermen's behavior to be more pragmatic, eradicating indigenous fishermen's understanding of fishing (Pet-Soede, 2000).

The societal impact of the public's concern for the preservation of coral reefs being categorized as neutral. Respondents did not believe there was a difference in the level of concern in coastal areas before and after development. The role of coral reefs as a habitat and a place to discover fish is well understood (Yasir Haya & Fujii, 2019).

The notion of respondents feeling protected from the crime of destructive and illegal fishing has a favorable impact on the social element. The large number of ships and officers in coastal areas have ramifications for limiting the space available for damaging and illegal fishing. According to study by Timm, et al. (2017), the use of bomb fishing and coral fishing with anesthetics pose the greatest harm to coral reef ecosystems.

The negative perception of fishermen's revenue from reef fish catches has declined from year to year, owing to the economic influence of coastal development. This is also pertinent to the idea that fishermen's operational costs for catching fish are rising. Development operations, according to respondents, disrupt coral reef habitat, causing fewer fish to be found in shallow areas and forcing fishermen to travel greater distances.

However, it is recognized that there is a good opinion that CSR to rebuild coral reefs provides the community with a side work option as an additional source of income. Coral reef rehabilitation initiatives are a form of empowerment and compensation for affected people, according to information provided by respondents. Private firms provide funds in partnership with companies or non-governmental organizations (NGOs) as activity organizers. People have a favourable opinion of these events because they get paid directly for their involvement. Making artificial reefs out of concrete cylinders and transplanting corals using spider frames are two examples of rehabilitation initiatives. Future results of this work are predicted to be positive, such as an increase in the number of reef fish and the establishment of an ecotourism destination.

Furthermore, based on the findings of the study, it is known that the community has a negative attitude toward pollution-causing coastal development. The use of a pump dredger (dredging the suction system) in the process of dredging the sea sand material (Randall, et al. 2011), the construction of an integrated WWTP (Wastewater Treatment Plant) for industry and the use of septic tanks biofill for communal waste, and the control of the flow of water circulation by dredging periodically (Capodaglio, 2017) are all examples of management methods that can be used.

The assertion that the impact of coastal development causes direct damage to coral reefs has a neutral perception index among respondents. Similarly, when asked whether coastal

development has an impact on coastal morphological disturbances, the respondent's perception index is neutral.

5) CONCLUSION & SUGGESTION

It is possible to draw the following conclusions based on the findings of this study:

1. The positive value consequences include providing security against illegal fishing and providing a side work for the community, namely coral reef rehabilitation.
2. The disturbance of local wisdom, the increase in environmental degradation, the decrease in the number of fish catches, and the higher fishing operations costs are all negative value impacts.
3. The level of public awareness of coral reef preservation, as well as the notion that coastal development does not cause direct damage to coral reefs or coastal morphological disturbances, are all neutral value impacts.

The study suggests, as follows:

1. It is vital to manage the impact of development and community empowerment in a sustainable manner in order to regulate public perception.
2. To have a thorough understanding of the community's behavior, research that evaluates other impacting elements such as attitudes and motivation is required.

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