

# Community Knowledge About the Functions of Coral Reefs in Barrang Caddi Island, Spermonde Islands

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## ABSTRACT

The level of community knowledge about coral reefs in Barrang Caddi Island Spermonde Islands is very diverse. The applied fisheries control policies and regulations are even considered obstacles for the community in utilizing marine resources, especially coral reef resources. This study aims to reveal community knowledge about the function of coral reefs with their sources of income. When the research was conducted from October to November 2021, this research was classified as ex post facto with a quantitative descriptive survey method. A total of 76 people were chosen randomly to describe the people's knowledge on the island. The results showed that the knowledge of the community about the use of coral reefs and efforts to rehabilitate coral reefs was moderate. In contrast, the knowledge of the community about fishing activities that had the potential to damage coral reefs, restrictions on catching specific biota, and marine space utilization zones was classified as low. Based on the research, it can be concluded that community knowledge about the function of coral reefs on Barrang Caddi Island still needs to be improved through counselling and supervision.

**Keywords:** Human behavior, marine ecosystems, catch fisheries, Spermonde Islands

## 1. INTRODUCTION

Barrang Caddi Island is part of the Spermonde Archipelago, characterized by a wide expanse of coral reefs. The land area is around 0.57 km<sup>2</sup> with an altitude of <500 meters above sea level. Most Barrang Caddi Island residents work as fishermen, while others work as laborers and entrepreneurs. Barrang Caddi Island is an island that is densely populated and has quite dense residential buildings in every corner of the island [1].

The level of damage to coral reefs in the Spermonde Islands is around 299.97 ha/year [2]. The average coral reef ecosystem around the islands of Makassar City is 19.64 percent, with conditions ranging from damaged to moderate [3]. The main causes of coral reef damage include catching reef fish using explosives (bombs), anesthetics or toxic chemicals (*potassium cyanide*), crowbars (*mini muroami*), taking coral for building materials and commercial exports [2], water pollution [4], eutrophication and sedimentation [5][6], solid waste [7], air pollution and climate change [8].

The selection of this research location was based on: 1) the condition of the coral reef ecosystem ranged from damaged to moderately damaged [9]; 2) the existence of a coral reef ecosystem rehabilitation program that involves the community; 3) although it is located on

small islands, the means of transportation and communication are smooth.

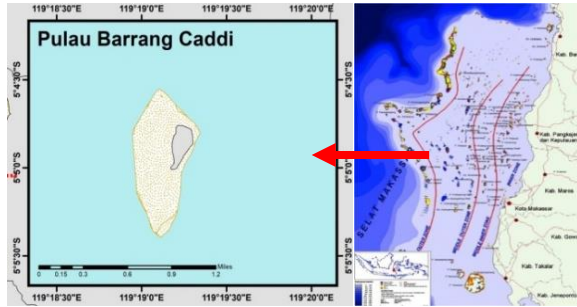
In international policies, laws, and regulations, the protection and management of coral reef ecosystems have been regulated. However, the policy's success is undoubtedly strongly influenced by human behavior, especially the fishers' knowledge of marine ecosystems' impacts. [10] explains that humans, the environment, and development, in general, are interrelated and very complex. In theory, Hungerford & Volk [11] state that various factors determining human behavior in interacting with the environment include knowledge, motivation, attitudes, skills to apply knowledge, and other situational factors.

Barnett [12] stated that knowledge is memory or known on materials studied based on scientific reasoning. Based on this background and theory, research was conducted on knowledge, which is defined as everything that the community knows in the conceptual, procedural, and factual realms regarding various matters concerning the function of coral reef ecosystems in the marine area of Barrang Caddi Island, Spermonde Islands.

## 2. METHODS

### 2.1. Time and Place of The Study

This research was conducted on Barrang Caddi Island, Spermonde Islands. Data collection was carried out from October to November 2021 (Figure 1).



**Figure 1.** Research Location Map

### 2.2. Data Collection

This research was classified as ex post facto with a descriptive quantitative survey method. Furthermore, respondents were selected by random sampling method with a total of 76 people who were sorted by age, namely over 17 years. Data were obtained through interview techniques using interview guidelines and questionnaires.

### 2.3. Data Analysis

Data processing in this study used descriptive analysis methods. Descriptive analysis aims to transform a set of raw data into a form that is easier to understand in the form of more concise information. Descriptive analysis in this study was conducted on the results of respondents' data based on profiles, demographics, and knowledge. The descriptive method describes the collected data without making general conclusions or generalizations. The scope of knowledge measured is about the use of coral reefs, fishing activities that can damage coral reefs, restrictions on catching specific biota, setting up marine space utilization zones, and efforts to rehabilitate coral reef ecosystems.

## 3. RESULTS AND DISCUSSION

### 3.1. General Condition of Research Site

Barrang Caddi Island is located in the Sangkarrang Islands District, Makassar City, east of Barrang Lompo Island, extending northeast-southwest, ±11 km from the mainland of Makassar City. The island can be accessed by using a passenger ship with 30 people. The topography of a small island with relatively sloping sandy beach conditions. The tidal data shows the occurrence of two high tides and two mixed tides in a day. The type of coral reef in Barrang Caddi Island is a

fringing reef type. Barrang Caddi Island has a coral cover dominated by a live coral cover, namely hard coral, which is dominated by coral species with massive, digitate and foliose growth forms, soft coral, and dead coral cover.

### 3.2. Socio-Economic Conditions

Based on the results of interviews with respondents on Barrang Caddi Island, the education level of the community is relatively very low. 90.79% have an only elementary school education, 5.26% have a junior high school education, and only 3.95% reach high school and college education levels. The fishing gear used by fishers in coral reef ecosystems is around 68.42% using Lepa-Lepa (fishing line), 15.79% Rengge (gill nets), and 9.21% traps 6.58% other tools. The fishers' income ranges from Rp. 750,000 to Rp. 3,000,000 per month. Fishers fishing for 1 (one) trip on average between 7-10 hours with an average catch of 10-20 kg. In general, fishers' catches are sold fresh to collectors at a price determined by the collectors. The collectors then sell the fish to Makassar City.

### 3.3. Community Knowledge About Coral Reefs

#### 3.3.1. Knowledge of Coral Reef Use

Based on the analysis results, 39.47% of fishers have high knowledge of the use of coral reefs, 46.05% have moderate knowledge, and 14.47% have low knowledge. The average value of knowledge is 5.72 or is in the medium category. Respondent's knowledge of the function of coral reefs leads to direct economic benefits. Generally, respondents already know the function of coral reefs as a place to find fish, as a place for fish to live, as a barrier to waves. However, respondents do not know the function of coral reefs to provide cosmetic raw materials, as a tourist attraction, and other environmental services. Some respondents consider coral reefs as building foundation materials.

#### 3.3.2. Knowledge of Fishing Activities that Potentially Damage Coral Reefs

Based on the analysis results, 14.47% of respondents have high knowledge about fishing activities that can damage coral reefs, 23.68% have moderate knowledge and 61.84% have low knowledge. The average value of knowledge is 3.27 or is in a low category. Fishing that is not environmentally friendly disrupts the sustainability of coastal ecosystems and harms fishers in the future. According to the operation of fishing gear at the fishing ground, several types of fishing gear used on coral reefs have different impacts on coral reefs. The characteristics of the impact caused by the operation of fishing gear on the coral reefs of Barrang Caddi Island during direct field observations can be seen in Table 1 below.

**Table 1.** Impact of using fishing gear on coral reefs

Fishing Equipment	Impact
Lepa-Lepa (fishing)	Fishers drop anchors on coral reefs while installing and waiting for the results of their fishing gear. Anchors automatically damage coral reefs.
Rengge (gill nets)	Damage to coral reefs due to snagging or being carried away by nets, including branching corals and foliose corals.
Bubu (Traps)	Chunks of coral are scattered and piled up around the location of the trap placement. The dead coral chunks are generally from massive corals.

Based on this, it is necessary to carry out continuous guidance to fishers to raise awareness regarding environmentally friendly fishing methods. The topic of guidance is the length of fishing gear, ballast, the size of the mesh, the use of nets up to the water column and not to the bottom of the waters, provision of mooring buoys to minimize the use of anchors, and the operation of traps by not placing them on coral reefs or using live coral to cover the traps.

From the results of interviews with fishers on Barrang Caddi Island, it is indicated that there has been a decline in the number of reef fish catches from year to year. The biggest threat to damage to coral reefs and reef fish in the waters of Barrang Caddi Island is catching using bombs and poison stun guns. Generally, respondents agree that prohibiting bombs and anesthetics negatively impacts coral reefs. According to the respondent's experience, the vibration is extreme when a bomb explodes. The vibration distance can reach hundreds of meters and cause coral reefs to be damaged and uplifted, also, with anesthetics where potassium is sprayed around the coral reef, causing bleaching and a pungent odor.

*3.3.3. Knowledge of the Prohibition of Catching Certain Biota*

The analysis results found that 17.11% of respondents had high knowledge about the prohibition of catching specific biota, 39.47% had moderate knowledge, and 43.42% had insufficient knowledge. The average value of knowledge is 2.72 or is in a low category. The rules and policies that restrict fishers from catching marine biota, including clams, turtles, napoleon fish, lobsters, crabs, and several other types of organisms, do not seem to be entirely accepted by the respondents. The prohibition to take the biota is considered detrimental to fishers because the biota is provided by nature and is intended for human life. They do not yet know the substance of the rules and policies

to save the proliferation of biota species that are considered rare. Respondents also did not feel a decrease in the number of prohibited biota. According to respondents, these biota fluctuates depending on the breeding season.



**Figure 2.** Biota (a) Hole clams (*Tridacna crocea*); (b) Hawksbill turtle (*Eretmochelys imbricate*)

*3.3.4. Knowledge of Marine Spatial Utilization Zone*

The analysis results show that only 15.79% of fishers have high knowledge of marine space utilization zones, 36.84% have moderate knowledge, and 47.37% have low knowledge. The average value of knowledge is 2.96 or is in a low category. The regulation of marine space utilization zones is needed for sea lanes, fishing, cultivation, and conservation [13]. The zoning can resolve conflicts between fishers, cultivators, and the community [14]. However, based on the study results, it is known that the public does not know and tends to reject the existence of this arrangement. This can be caused by a lack of attention to the process of involving the community in management and decision-making related to the use of marine space, social jealousy of community members who feel they are not involved, or the direct economic benefits of the policy implications have not been felt.

*3.3.5. Knowledge of Coral Reef Ecosystem Rehabilitation Efforts*

The analysis results found that 26.32% of fishers know how to rehabilitate coral reef ecosystems, 46.06% have moderate knowledge, and 27.63% have insufficient knowledge. The average value of knowledge is 5.26 or is in the medium category. This knowledge was obtained because of the coral reef ecosystem rehabilitation program carried out involving the community, including the Core map (Coral Reef Rehabilitation and Management Program) by the Ministry of Marine Affairs and Fisheries [15], the Mars Assisted Reef Restoration System Program by Mars Sustainable Solutions as well as programs initiated by the Regional Government and Universities.

It can be concluded that the knowledge of the people on Barrang Caddi Island about efforts to rehabilitate coral reef ecosystems is good, but the capacity building still needs to be carried out through programs that are carried out sustainably.



**Figure 3.** Rehabilitation program: (a) concrete cylinder artificial reef; (b) coral transplant

#### 4. CONCLUSION

Based on the results of this study, it can be concluded as follows:

1. Community knowledge about the use of coral reefs and coral reef rehabilitation efforts is moderate.
2. Community knowledge about fishing activities that can damage coral reefs, restrictions on capturing specific biota, and marine space utilization zones are classified as low.

#### 5. SUGGESTION

1. Development materials related to the function of coral reefs in the Spermonde Islands, especially Barrang Caddi Island, can be developed based on community knowledge.
2. The need for diversification of community income so that it does not rely solely on capture fisheries activities but aquaculture, fish processing, and ecotourism.
3. To comprehensively determine the community's behavior, it is necessary to conduct research that measures other influencing variables such as attitudes, motivation, and concern.

#### ACKNOWLEDGMENTS

We wish to extend our sincere gratitude and appreciation to all who contributed to this study in any way. In particular, we thank the South Sulawesi Provincial Government, Mars Sustainable Solutions, and all who provided assistance and support in the field and during the analysis stages of the study.

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