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Condition of Coral Reefs and Abundance of Coral Fishes of the Chaetodontidae Family in the Waters of Sironjong Gadang Island, Pesisir Selatan District, West Sumatra Province

Immanuel Grahan Deyon Satyawira[1*], Thamrin[1], Mubarak[1]
[1]Department of Marine Science, Faculty of Fisheries and Marine, Universitas Riau, Pekanbaru 28293 Indonesia
Corresponding Author: Immanuel.grahan01@gmail.com

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ABSTRACT

Sironjong Gadang Island is one of the islands in the Mandeh Tourism area in Pesisir Selatan Regency, West Sumatra, Indonesia. One of the ecosystems affected by tourism activities is coral reefs. Monitoring the coral reefs' condition and the abundance of coral fish in the Chaetdontidae family is carried out to find out this. This research uses survey research methods. The temperature measurement results obtained an average of 30.2^{o}C, current speed measurements received an average of 0.12 m/s, salinity measurements obtained an average of 30 ppt, and brightness measurements show that the brightness of these waters is 9 m. Tide measurements in the waters of Sironjong Gadang Island, carried out on March 7–8, 2023, are double daily tides (semi diurnal tide). Then, the results from the coral reef cover of Sironjong Gadang Island waters obtained a percentage ranging from 2.34 - 12.83%, with an average rate of live coral reef cover of 5.96%, which is included in the poor category. Furthermore, the results at each research station in the waters of Sironjong Gadang Island showed that 54 coralfish individuals were found, with the number of coralfish at each depth ranging from 4 - 10 individuals. The most common types of coral fish are species. Acuminate had 18 individuals; the fewest types of coral fish found were *Chaetodon trifasciatus* and *C. tristichous,* each numbering two individuals. There is a solid relationship between live coral reef cover and the abundance of coral fish in the Chaetodontidae family, where live coral reef cover influences the plenty of coral fish by 61.11%, which means that the higher the percentage of live coral cover, the higher the value of coral fish abundance.

Keywords: Chaetodontidae, Cover Conditions, Coral Reefs

1. INTRODUCTION

Coral reefs are one of the tropical aquatic ecosystems that protect an area from waves that can cause abrasion (Dejulien et al., 2022). Coral reefs, as highly productive marine ecosystems, are places where various biological groups depend. Various kinds of biota interact with each other in the ecosystem of coral reefs; the better the condition of the coral reef, the more abundant the biota that live in these waters. The condition of coral reef cover is known based on the percentage of coral reef cover. The level of coral cover, according to (Nanda et al., 2020), is 0–24.9%, classified as poor; 25–49.9%, classified as moderate; 50-74.9%, classified as good; and 75–100%, classified as very good. In the coral reef ecosystem, you can also find coral fish.

Coral fish are a fauna associated with coral reefs and can be found in various microhabitats. Based on the role of coralfish in an ecosystem, they can be grouped into three main groups: indicator, primary, and target. Major fish often appear in a coral reef ecosystem, associated both as settlers and passers-by. Indicator fish are fish that function as indicators of a body of water, generally indicator fish species from the Chaetodontidae family (Yuliana and Rahmasari, 2021).

One group of biota that lives in association with coral reefs and plays a vital role in the coral reef ecosystem is the Chaetodontidae fish. Chaetodontidae family coral fish are distributed only around coral reefs and will be found on every coral reef (Paulangan et al., 2019). The coral fish of the Chaetodontiade family are very closely related to coral reefs. Therefore, this family of fish is used as an indicator of coral health because its presence can be used to assess, monitor, and predict the condition of coral reefs. So, a

decrease in population numbers or the absence of this species indicates that coral reefs have changed (Edrus et al., 2021).

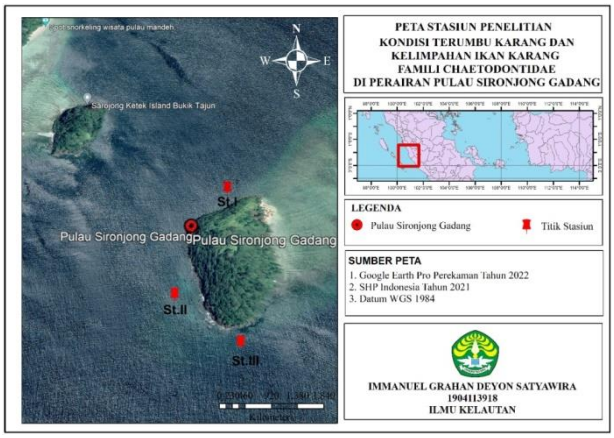
Sironjong Gadang Island is an uninhabited island on the west side of Sumatra Island. This island is one of the strategic island tourist attractions in the Pesisir Selatan Regency because it is in the Mandeh area. Thus, many human activities are carried out there. These activities are feared to negatively impact fish resources that depend on live coral reef cover, especially the coral fish of the Chaetodontidae family.

Due to the minimal information regarding the condition of coral reefs and the abundance of coral fish of the Chaetodontidae family in the waters of Sironjong Gadang Island, West Sumatra, the author is interested in conducting this research so that the results of this research will help readers to obtain the latest data related to the condition of coral reefs and the abundance of Chaetodontidae coral fish.

2. RESEARCH METHOD

Time and Place

This research will be carried out in March 2023. Data was taken in Sironjong Gadang Island, Pesisir Selatan Regency, West Sumatra Province (Figure 1).



Gambar 1. Research station map

Method

This research uses a survey method, namely direct observation at the research location. The data collected is in the form of primary data and secondary data. Preliminary data is from survey results and direct observation at the research location. Primary data will include observations of water parameters, coral reef cover, and the abundance of coral fish in the Chaetodontidae family. The results of the preliminary data analysis are then tabulated in the form of tables and figures, and the existing data is then compared with the literature. Meanwhile, secondary data is obtained from previous research, books, journals, articles, and reports from related agencies. Analysis of the relationship between the percentage of live coral cover and the abundance of reef fish using simple linear regression.

Procedures

Determination of research stations was done using purposive sampling, namely determining station points with specific considerations when in the field. To determine the station point, direct observations were first carried out using the Free Swimming Observation method, which aims to obtain a general picture of the distribution of coral and the abundance of coral fish found in the waters of Sironjong Gadang Island. The position of the research station is determined based on the cardinal directions (Figure 1). Station I is to the island's north, Station II is to the west, and Station III is to the south. Determining the station coordinates is done using GPS. Station I ($01^{o}13'36.6"$ LS $100^{o}24'28.4"$ BT).

Station II ($01^{o}13'43.9"$ LS $100^{o}24'20.9$ LS) Station III ($01^{o}13'48.6"$ LS $100^{o}24'34.7$ BT). At each station, three transects were placed with depths of 3 m, 6 m, and 9 m. Transects are installed parallel to the coastline according to the location of the designated stations. After that, data will be collected by diving using SCUBA equipment.

Observations of coral reef cover were carried out using the Underwater Photo

Transect (UPT) method (Nurrahman and Faizal, 2020). The transect stretches parallel to the coastline for 50 m. Coral reef cover data was collected by taking underwater photos, where the angle of the photo was taken perpendicular to the bottom of the substrate. The data taker only takes pictures of the substrate as wide as the size of the iron frame. Photographing starts from the 1st meter on the left of the transect line as "frame 1", followed by taking photos at the 2nd m on the right of the transect line as "frame 2," and so on until the 50th-m transect. After all the pictures are taken, they are saved in the camera memory and then transferred to the laptop to be managed more regularly before they are analyzed with CPCe software.

Five oceanographic parameters are observed in this study, including temperature, current speed, salinity, brightness, and tides. Data collection time is carried out on board the ship at each station on the water surface with one data collection.

Data Analysis

Coral Reef Cover

The results of underwater photography at each 1 m interval of the transect line were then analyzed using CPCe software to obtain quantitative data such as the percentage of coral cover and biota. Data analysis was carried out on each frame by selecting a random sample of 30 points for each frame, and this was representative for estimating the percentage of category and substrate cover (Nurrahman and Faizal, 2020). In this way, the data recorded is only the biota and substrate precisely at the point positions randomly determined by the CPCe software. The classification of coral reef conditions based on the percentage of cover is as follows (Hadi et al., 2018): very good 75-100%; Good 50-74.9%; currently 25-49.9%; and bad 0-24.9%

Abundance of Reef Fish

Fish abundance is the number of fish found per unit transects area. Referring to research by Nanda et al. (2020), the abundance of coral fish is calculated using the formula:

$$Xi = \frac{xi}{A} \; x \; 10.000$$

Information :

Xi = abundance of type i fish (ind/ha)

xi = number of fish of type i

A = Transect area (m^2).

Relationship between Coral Reef Cover and Abundance of Reef Fish in the Chaetodontidae Family

The relationship between the percentage of coral reef cover and the coral fish of the Chaetodontidae family can be calculated by looking for the regression value (Y). The general equation of simple linear regression contained in Tanjung (2014) is as follows:

$$Y = a + bX$$

Where a = constant, which indicates the point of intersection of the line formed by the regression equation with the Y axis. Moreover, b = coefficient of slope of the regression line. The strength of the relationship can be seen from the correlation coefficient (r) with the following categories (Tanjung, 2014): r = 0–0.25 means the relationship is weak; r = 0.26–0.50 means a medium relationship; r = 0.51–0.75 indicates a strong relationship; r = 0.76–1.00 means the relationship is very strong.

3. RESULT AND DISCUSSION

General Description of Research Locations

Sironjong Gadang Island is an uninhabited island. Administratively, it is included in Koto. This island is in the Mandeh tourist area. This island has topography which is generally hilly and cliffy. This island faces the Indian Ocean, with only a few sandy beaches. The physical appearance of these two pyramid-like islands is rocky but has been lush with trees since ancient times. Large waves from the ocean waters also hit this island. Apart from that, the beaches on this island are rocky and have cliffs.

Measuring oceanographic parameters is one way to determine whether the condition of a body of water is good or bad. Oceanographic parameters also support and limit the sustainability or ecosystem life of aquatic organisms, especially coral reefs and coral fish. The temperature measurement results were 29.8–30.6^{o}C with an average temperature value of 30.2^{o}C (Table 1). Marine environmental factors, especially temperature, influence the distribution of coral reefs; a temperature of 25 – 29°C is ideal for coral growth (Yusapri et al., 2012). This shows that the temperature in the waters of Sironjong Gadang Island is classified as unfavorable because it exceeds the ideal temperature for coral reef growth, which can cause the potential for coral bleaching. The results of measuring physical oceanographic

parameters in this study can be seen in Table 1 and Figure 2

Table 1. Measurement of physical oceanographic parameters in the waters of Sironjong Gadang Island

No	Parameter	Station			Average
		I	II	III	
1.	Temperature (℃)	30.6	29.8	30.3	30.2
2.	Current speed (m/s)	0.1	0.134	0.128	0.120
3.	Salinity (ppt)	30	31	29	30
4	Brightness (m)	9	9	9	9

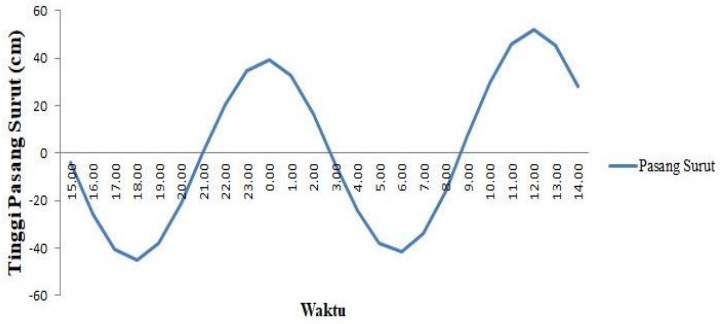


Figure 2.Tidal measurement results in the waters of Sironjong Gadang Island.

The current speed measurement results were in the 0.0–0.134 m/s range with an average current speed value of 0.12 m/s. Barus et al. (2018) state that a good current for coral reef growth is <0.2 m/s. The salinity measurement results ranged from 29 - 31 ppt with an average salinity value of 30 ppt. Coral reefs can grow optimally with salinity between 32–35 ppt (Khaidir, 2020). Coral reefs are less developed in areas with much freshwater runoff because salinity is lower. This shows that the salinity in the waters of Sironjong Gadang Island is not yet in the excellent category.

The brightness measurement results show that these waters' brightness is 9 m. Based on the quality standards of PP No.22 of 2021, the ideal brightness for coral reef growth is above 5 m. Measurement of tidal data in the field is needed to validate NaoTide tidal data so that this data can be used as input for oceanographic parameter data (Figure 2).

The results of tidal measurements in the waters of Sironjong Gadang Island were carried out on March 7 – 8, 2023. Based on the graph, it is known that there are similar patterns between NAOTide tides and field tides. The graph shows that the NAOTide and Field tidal types are double daily tides because, in one day, there are two highs and two lows with almost the same average intensity, namely 12 hours. This is the opinion expressed by Zuhaira et al. (2020), who said that the waters of West Sumatra have a semi-diurnal tidal type if seen based on the tidal components produced in the waters of Sironjong Gadang Island.

Condition of Coral Reef Cover

The percentage of coral reef cover shows the value of the condition of the living coral reefs in a body of water. The results of the percentage of live coral reef cover at each research station in the waters of Sironjong Gadang Island obtained a percentage ranging from 2.34-12.83%, with the average percentage of live coral reef cover being 5.96%, which is included in the lousy category (Table 2). This is to the criteria for assessing the condition of coral reefs by the Oceanographic Research Center-Institute of Sciences (Puslit Oceanography-LIPI). Various water parameters, especially sea surface temperature, influence the low value of the living coral cover. An increase in physical parameters not by the coral reefs tolerant limits will cause coral death.

Based on the analysis results of coral reef cover data in the CPCe software, at station I, it was found that the percentage value of live coral cover at a depth of 3 meters was only 7.69%, which was included in the poor category, with the most dominating component being the algae (TA) component at 34.56%.

The abiotic component (R) was 29.24%, and (RCK) was 14.98%. At a depth of 6 meters, the percentage value of live coral cover is only 3.96%, which is included in the poor category, which is dominated by the algae component (TA) at 34.73%, the abiotic component (R) at 28.93% and (S) at 18.44%. Furthermore, at a depth of 9 meters, the percentage value of live coral reef cover is only 2.34%, which is included in the poor category, which is dominated by the abiotic component (R) of 32.51%, (S) of 30.51% and the algae component (TA) of 18.89 %.

Table 2. Percentage of coral reef cover in the waters of Sironjong Gadang Island

Station	Depth (m)	Live coral cover (%)	Category
I	3	7.69	Bad
	6	3.96	Bad
	9	2.34	Bad
II	3	2.95	Bad
	6	3.56	Bad
	9	2.53	Bad
III	3	10.86	Bad
	6	12.83	Bad
	9	6.96	Bad
Average		5.96	Bad

Then, at station II, the percentage value of live coral cover at depth three was obtained, namely 2.95%, which was included in the poor category, with the most dominating component being the abiotic component at 38.50%, the algae at 24.72% and 9.63%. At a depth of 6 meters, the percentage value of coral reef cover was 3.56%, including in the poor category, which was dominated by the abiotic component of 35.67%, the algae component of 34.11%, and (S) of 8.15% Then at depth nine the percentage value of coral reef cover is 2.53%. The most dominating component is the abiotic component at 42.53%, the algae component at 27.80%, and (S) at 11.13%.

Meanwhile, at station III, the percentage value of live coral reef cover at depth 3 was 10.86%, which was included in the poor category, with the most dominating component being the algae component at 16.62%, the abiotic component (R) at 19.50% and (S) of 12.06%. At a depth of 6 meters, the percentage value of coral reef cover was obtained at 12.83%, including in the poor category, with the most dominating components being the algae component at 28.34%, the abiotic component at 22.63%, and (RCK) amounting to 20.89%. Then, at a depth of 9, the percentage value of coral reef cover is 6.96%, which is included in the poor category. The most dominating component is the abiotic component (R) at 33.47%, (S) at 21.75 and the algae component (TA) at 20.69%.

At several research stations, rubble (R) was found to be quite dominant. Rubble is often found around coral reef observation locations. The highest rubble was found at station I. According to (Dasmasela et al., 2019), this rubble or coral fracture was thought to be caused by fishing activities using bombs. Fishing using bombs results in broken coral and poor coral growth. Another method of fishing that causes coral rubble/fractures is fishing gear used by fishermen to catch coral fish with the target of usually sticking the fishing gear into coral reefs, which causes coral fragments (Rahmitha, 2015).

Then, rock (RCK) was found in many research stations. Rocks/large chunks of coral that are high in a coral reef area are a terrible thing. Rocks/large chunks of coral can impact decreasing live coral cover (Johan et al., 2017). This is due to the small percentage of coral reef cover at the research station, which is dominated by rock (large chunks of coral).

The high level of turf algae at several research stations is one of the causes of damage to coral reefs. Turf algae found at the research location is abundant and covers the coral, causing little living coral cover. Increasing turf algae will inhibit coral reefs' growth and metabolic processes. This is the opinion of (Nusaputro et al., 2019) that turf algae live by growing from the bottom and then attack live coral by sticking to it from the bottom to the top, which results in death for corals that do not

have a sound defense system.

Many macroalgae were also found in this research, where they live in sandy substrates and rugged substrates around coral reefs at the research location. According to research conducted by (Febrizal et al., 2009), macroalgae is relatively high, which causes coral damage due to the relationship between corals and macroalgae in fighting for objects. Macro algae quickly fill the space of dead coral cover as a place for its growth.

Also, sand was found to dominate several coral reef observation areas. Sand/sand is a threat to the health of coral reefs because the high sand/sand cover on the coral cover also causes coral polyps to close, disrupting the coral foraging process (uptake). When currents sweep away sand, it will reduce the visibility of the water and prevent the penetration of light into the sea, thereby reducing the symbiotic photosynthesis process of coral. Increased sand can also trigger algae blooms on bottomwater substrates (Nusaputro et al., 2019). This statement is made by several observation areas that are dominated by sand and also find abundant types of algae.

The dominant type of Acropora at each research station is the Acropora branching type. At each research station where Acropora Branching was found, it had a high brightness value. This is based on research conducted by Barus et al. (2018), who found that coral reefs need sufficient light to carry out photosynthesis, and Acropora Branching usually grows in clear waters. Apart from that, the current speed at each research station is still considered a good current, thus supporting the growth of branching coral reefs. The non-Acropora type of Life coral that dominates each research station is the Coral Encrusting (CE) type. Encrusting coral is a coral colony that spreads along the bottom of the waters, from shallow to deep waters up to 15 m. It can live with sufficient light intensity, followed by Coral Massive (CM), which dominates the research station. According to Putra et al. (2022), Massive Coral is hard coral in the form of large boulders so that it can live protected by waves, found in shallow waters near murky coastlines.

Types and Abundance of Reef Fish, Family Chaetodontidae

Coral fish abundance is the number of coral fish found at an observation location per unit area of the observation transect. As for the results of observations of coral fish of the Chaetodontidae family at the research location, it was found that there were ten species of coralfish of the Chaetodontidae family consisting of seven species of Chaetodon, one species of Forcipiger, and two species of Heniochus, including *Chaetodon kleinii, C.rafflesia, C.triangulum, C.treacherous, C.trifasciatus, C. vagabonds, Forcipiger flavissimus, Heniochus acuminatus,* dan *Heniochus pleurodynia.*

Differences in the abundance of Chaetodontidae fish found at each research station cannot be separated from environmental factors and the condition of coral reefs as a habitat for Chaetodontidae fish. Suryanti et al. (2011) said that the high abundance of Chaetodontidae fish in water can reflect that coral reefs are in good condition, identified by high live coral cover. Based on the observations at each research station in the waters of Sironjong Gadang Island, the total number of coralfish individuals found was 54, with the number of coralfish at each depth ranging from 4 to 10 individuals. Of this number, the type of coral fish most often found is the species *H.acuminatus*, with 18 individuals.

This type of fish easily adapts to both tropical and sub-tropical waters, so it is not uncommon for this type of fish to still be found even though coral conditions are classified as poor. Good. Then, the coral fish that are least often found are *C.trifasciatus* and *C.tririchrous*, with two individuals of each species. Station III, with a depth of 6 meters, is the location that has the highest number of coral fish, with ten individuals. In comparison, station I is 9 meters deep, station II is 3 meters deep, and 9 meters is the location with the lowest number of coral fish with 4 individuals (Table 3).

Chaetodon trifasciatus is one of the few types of coral fish found at the research location, where only two individuals were found at station I at a depth of 6 m. The small number of *C. trifasciatus* species found is thought to be due to the poor percentage of live coral cover, resulting in a small supply of live coral food, making it difficult for these fish to find food. This is the opinion expressed by Nurjirana (2016), who said that *C. trifasciatus* lives in good coral reef conditions with high live coral cover providing large amounts of food so that this fish can quickly obtain food for population growth and development.

C.trichrous is also the least common coral fish species in the research location. According to Winata et al. (2022), this fish species only likes rocky reefs, and its food is a rigid substrate and plankton.

Table 3. Types and number of individual coral fish of the Chaetodontidae family in the waters of Sironjong Gadang Island

Genus	Species	Station I			Station II			Station III			Total (ind)
		Depth (m)									
		3	6	9	3	6	9	3	6	9	
Chaetodon	*C. collare*	0	0	0	2	1	0	0	3	0	6
	C. kleinii	0	0	0	0	0	0	2	2	1	5
	C. rafflesii	0	0	0	1	1	0	0	0	2	4
	C. triangulum	0	0	3	0	0	0	0	0	1	4
	C.trichrous	0	0	0	0	0	0	2	0	0	2
	C. trifasciatus	0	2	0	0	0	0	0	0	0	2
	C.vagabundus	0	0	0	0	2	1	0	2	0	5
Forcipiger	*F. flavissimus*	2	0	0	0	0	0	2	0	0	4
Heniochus	*H. acuminatus*	4	3	1	1	4	3	0	1	1	18
	H. pleurotaenia	0	0	0	0	0	0	1	2	1	4
Amount (ind)		6	5	4	4	8	4	7	10	6	54

Judging from observations at three research stations, coral fish species are always present in the observations of the three stations. This species is suspected to eat coral polyps and prey on various plankton types living within a few meters of coral reefs. These findings are based on research by Nanda et al. (2020), which states that *H.acuminatus* fish generally eats coral polyps (obligate coral eaters) as the primary food source for this omnivorous species.

Table 4. Abundance of coral fish of the chaetodontidae family in the waters of Sironjong Gadang Island

Station	Depth (m)	Number of Individuals	Abundance of Reef Fish (ind/m^2)	Abundance of Coral Fish (ind/ha)
I	3	6	0.024	240
	6	5	0.02	200
	9	4	0.016	160
II	3	4	0.016	160
	6	8	0.032	320
	9	4	0.016	160
III	3	7	0.028	280
	6	10	0.04	400
	9	6	0.024	240
Amount		54	0.216	2,160
Average		6	0.024	240

The research results showed that the abundance of coral fish in the Chaetodontidae family at each station and depth had relatively different values, with a range of 160–400 ind/ha and an average of 240 ind/ha. At station I, the abundance of coral fish found at a depth of 3 m was 240 ind/ha; at a depth of 6 m, it was 200 ind/ha, and at a depth of 9 m, it was 160 ind/ha. At station II, the abundance of coral fish found at a depth of 3 m was 160 ind/ha, at a depth of 6 m was 320 ind/ha, and at a depth of 9 m was 160 ind/ha. At station III, the abundance of coral fish at a depth of 3 m was 280 ind. /ha, a depth of 6 m is 400 ind/ha, and a depth of 9 m is 240 ind/ha.

The highest abundance of coral fish in the Chaetodontidae family is 400 ind/ha, found at station III at a depth of 6 meters. The lowest abundance of coral fish is 160 ind/ha, found at station I at 9 m, station II at 3 m, and 9 m.

Based on the table, the highest coral abundance occurred at station 3, with a depth of 6 m and a higher live coral category than the other stations (Table 4).

The high percentage of live coral cover influences this high abundance. The percentage of live coral cover impacts the sustainability of fish life, proving the ecological function of coral reefs, which are coral fish habitat, food provider, living place, shelter, spawning place, and foraging, which can influence fish abundance. The higher the value of live coral cover, the higher the abundance of coral fish (Muniaha et al., 2016).

This difference is thought to be the influence of the composition of the structure and substrate of the bottom of the waters, which is a limiting factor for the existence of Chaetodontidae fish, especially live coral cover, which is the leading food of Chaetodontidae fish and is therefore used as an indicator fish for assessing the condition of coral reefs (Amrullah et al., 2020). This is by the percentage of coral cover found in the waters of Sironjong Gadang Island, where stations I, II, and III have an average percentage of coral reefs of 5.96%, included in the poor condition category. The number of coral fish species from the Chaetodontidae family that inhabit coral reefs depends on the condition of the coral reef as a shelter and food source. The natural conditions of coral reefs also influence the number of individuals and the composition of fish species that can live in the area.

Relationship between Live Coral Reef Cover and Abundance of Reef Fish in the Chaetodontidae Family

The results of the analysis of the relationship between coral reef cover and the abundance of coral fish in the Chaetodontidae family using simple linear regression can be seen in Figure 3.

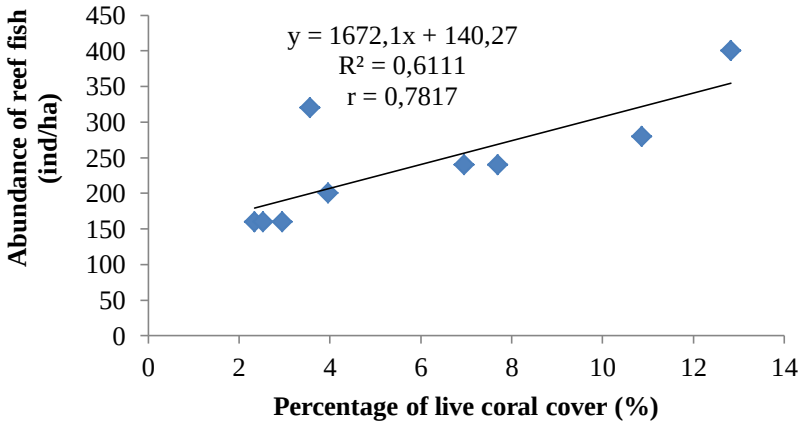


Figure 3. Relationship between live coral reef cover and abundance of reef fish in the Chaetodontidae family

Based on the results of simple linear regression analysis calculations, live coral reef cover with an abundance of coral fish of the Chaetodontidae family in the waters of Sironjong Gadang Island shows a coefficient of determination (R^2) value of 0.6111 and a correlation coefficient value (r) of 0.7817. The coefficient of determination (R^2) means that the amount of live coral reef cover influences the abundance of coral fish by 61.11%. The correlation coefficient (r) value of 0.7817 means that the relationship between live coral reef cover and the abundance of coral fish in the Chaetodontidae family is in the robust category (Tanjung, 2014).

Based on the results of simple linear regression analysis calculations, an F significance value of 0.01 ($p<0.05$) was obtained, which means that there is a relationship between live coral reef cover and the abundance of coral fish of the Chaetodontidae family in the waters of Sironjong Gadang Island. Then, based on Figure 3, the y value obtained is positive, indicating that the higher the percentage of live coral reef cover, the higher the abundance of coral fish found in the waters of Sironjong Gadang Island (Hidayat et al., 2018).

The solid relationship between the condition of coral reef cover and the abundance of coral fish in the Chaetodontidae family at this research location is thought to be caused by

the percentage of live coral reef cover of 5.96%, which is classified as poor and the abundance of coral fish in the Chaetodontidae family which is categorized as low.

The Chaetodontidae family coral fish is a species of fish that eats coral polyps. Damage to coral reefs is the main factor causing small numbers of reef fish from the Chaetodontidae family to be found at the three stations. Damaged coral reefs will impact the food for coral fish in the Chaetodontidae family. Coral polyps are not found on damaged or dead coral reefs (Dejulien et al., 2022).

Coral reefs at stations I, II, and III are damaged. This is thought to be why coral fish in the Chaetodontidae family are found in small numbers. The greater the percentage of live coral cover, the higher the number of coral fish in the Chaetodontidae family. According to (Titaheluw et al., 2015), an increase in the number of live corals will impact the availability of abundant food for coral fish from the Chaetodontidae family, where a good percentage of coral cover will have an impact on more living coral polyps so that food supplies will be abundant.

4. CONCLUSION

The waters of Sironjong Gadang Island have coral reef cover conditions in the poor category, with an average percentage of live coral reef cover of 5.96%. The abundance of coral fish of the Chaetodontidae family in the waters of Sironjong Gadang Island ranges from 160–400 ind/ha with an average of 240 ind/ha. There is a solid relationship between live coral reef cover and the abundance of coral fish in the Chaetodontidae family, where live coral reef cover influences the abundance of coral fish by 61.11%, the y value obtained is positive, indicating that the higher the percentage of live coral reef cover. The higher the abundance of coral fish found in the waters of Sironjong Gadang Island.

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