Coral Reef Coverage in the 17 Islands Marine Natural Tourism Park, Riung District, Ngada Regency, East Nusa Tenggara Province

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ABSTRACT

The 17 Islands Marine Nature Tourism Park (TWAL), located administratively in Riung District, Ngada Regency, East Nusa Tenggara Province, has limited information regarding the diversity of its marine biota. Therefore, further research on its underwater potential, particularly coral reefs, is essential. This research is expected to provide a deeper understanding of the richness of the marine ecosystem in the 17 Islands Marine Nature Tourism Park. The purpose of this study was to identify the types of coral reefs and assess the condition of coral cover in the 17 Islands Marine Nature Tourism Park (TWAL), Riung District, Ngada Regency, East Nusa Tenggara Province. This study employed data collection methods including observation and interviews with the local community and government. Coral reef data were collected using the Line Intercept Transect (LIT) method. The identification results show the presence of: (1) Four Acropora coral lifeforms, namely: Acropora Digitate Coral (ACD), Acropora Branching Coral (ACB), Acropora Tabulate Coral (ACT), and

Acropora Encrusting Coral (ACE); (2) Six Non-Acropora coral lifeforms, including Branching Coral (CB), Massive Coral (CM), Encrusting Coral (CE), Foliose Coral (CF), Mushroom Coral (CMR), and Heliopora Coral (CHL); (3) One form of Dead Scleractinia, identified as Dead Coral with Algae (DCA); (4) Three types of Algae, consisting of Macro Algae (MA), Coralline Algae (CA), and Halimeda Algae (HA); (5) Four other faunal lifeforms: Soft Coral (SC), Sponges (SP), Zoanthids (ZO), and Others (OT). Additionally, two abiotic forms were identified: Sand (S) and Rubble (R). The condition of coral reef cover in the 17 Islands Marine Nature Tourism Park (TWAL), Riung District, Ngada Regency, East Nusa Tenggara Province, ranges from moderate to good.

Keywords: Coral, Tourism Park, 17 Islands Riung, Ngada Regency, East Nusa Tenggara

INTRODUCTION

Marine Nature Tourism Park (TWAL) 17 Islands in Riung District, Ngada Regency located on the North Coast of Flores Island also offers marine tourism that can spoil the eyes with clusters of small islands and white sandy beaches. Not only marine tourism, TWAL 17 Island is part of the world's coral triangle, the turquoise blue sea water combines with the white sand of the beach, and the mangrove expanses are interconnected so that they support life, especially underwater nature, but it is very unfortunate that there is a lack of data on the structure of the reef community corals are in short supply. The TWAL 17 Islands ecosystem consists of dry tropical forests, savannas, mangroves, seagrass beds, and coral reefs. A total of 17 species from 10 families and 3 types of associations (coastal vegetation) make up the mangrove forest ecosystem on the coast of the islands. There is a relatively low diversity of flora in TWAL 17 Islands, this is more due to the rocky soil conditions so that there is less space available for soil media as a medium for various types of trees to grow. In addition, most of it is a karst area, causing low flora diversity.

As for the fauna of TWAL 17 Islands, it has various protected species, one of the most familiar is the Komodo dragon (Varanus komodoensis). This animal can be found on Ontoloe Island, the largest island in the western region of the region. Although it has a smaller size and brighter color compared to the Komodo Dragon in the Komodo National Park area, scientifically it is the same, only because of genetic variations that lead to morphology so that the Komodo dragon is more yellowish (Ciofi, 1999). The TWAL 17 Island area is also a habitat for various types of birds including the White-bellied Sea Eagle (Haliaetus leucogaster), and the Reef Egret (Egretta sacra), Red-footed Gosong (Megapodius reinwardt), Reed Lagoon (Centropus bengalensis), dugongs (dugongdugon), Long-tailed Monkeys (Macaca fascicularis) dolphins, whales, hawksbill turtles (Erectmohelys imbricata), green turtles (Chelonia mydas), giant clams

(Tridacna gigas), hollow nautilus (Nautilus popillius), round milkfish (Trochus niloticus), goat's head (Cassis cornuta), trumpet triton (Charonia tritonis). Mangrove vegetation can be found almost along the entire coastline which is a habitat for bats (Pteropus sp), especially on Ontoloe Island. This flying fox population is also a potential prey for the Komodo dragon. Another potential found in TWAL 17 Islands is one of the natural habitats of the Komodo dragon (Varanus komodoensis) or the local community calls it "mbou". TWAL 17 Islands in Riung District, Ngada Regency which is located on the north coast of Flores Island also offers marine tourism that can spoil the eyes with clusters of small islands and white sandy beaches. Not only marine tourism, TWAL 17 Islands As part of the world's coral triangle, the turquoise sea water combines with the white sand of the beach, the expanse of mangroves and are interconnected so as to support life, especially the underwater world, but it is very unfortunate that the lack of data on the structure of coral reef communities and reef fish is still lacking.

Based on these considerations, and referring to conservation areas that have been determined based on the division of blocks in the area consisting of marine protection blocks, utilization blocks and traditional blocks as well as the existence of tourism potential, especially marine tourism, it is deemed necessary to dig deeper regarding underwater potential. existing by monitoring marine biota (Identification of Coral Reefs and Reef Fish) in the 17 Island Marine Nature Tourism Park, Riung District, Ngada Regency, East Nusa Tenggara.

MATERIALS & METHODS

This research was conducted in August -October 2024 in the 17 Island Marine Nature Tourism Park, Riung District, Ngada Regency, East Nusa Tenggara Province with the research method used was the method of collecting data through observation and interviews with the community and local government. Coral reef data collection used

the Line Intercept Transect (LIT) method based on English et al, (1997) and for coral fish data collection using the Underwater Visual Census (UVC) method (English et al., 1994).



Figure 1. Research Location of Coral Reef and Reef Fish Identification in the 17 Island Marine Nature Tourism Park, Riung District, Ngada Regency, East Nusa Tenggara Province

The determination of the research station points was carried out using purposive sampling techniques. This technique is based on the consideration that the selected location can represent the waters of the TWAL 17 Islands marine area which refers to the block arrangement. Coral and reef fish community data collection consisted of 8 stations determined purposively for each of them referring to the block arrangement map made by the NTT KSDA Center which was made in September 2015, namely 4 observation stations in the utilization block named ST 1, ST 2, ST 6 and ST 7, 2 stations in the marine protection block are named ST 3 and ST 4 while the other 2 stations in the traditional block are named ST 5 and ST 8. They are marked using GPS (Global Position System). Each station consists of 2 (two) transects, each transect measuring 50 meters or 1 transect with a straight length of 100 meters, while water quality parameters are taken at these stations.

Name of Station	Coordinate	Description	Description of Block Arrangement					
ST 1	08°23'18.90" S	Rutong Island	Utilization Block					
511	121°03'18.14" E	Kutong Island	Offizzation Block					
ST 2	08°23'19.39" S	Putong Island	Utilization Block					
51 2	121°03'48.22" E	Rutolig Island	Othization Block					
ст 2	08° 22' 45,267" S	Patang Kalong Jaland	Marina Protection Plack					
51.5	121° 1' 32,123" E	Datalig Kololig Island	Warme Protection Diock					
ST 4	08° 22' 46,723" S	Patang Kalong Jaland	Marina Protection Plack					
514	121° 1' 36,663" E	Datalig Kololig Island	Marine Froteenon Block					
ст <i>5</i>	08° 23' 56,911" S	Lainiawa Island	Traditional Plack					
51.5	121° 1' 42,211" E	Lallijawa Islaliu	Traditional Block					
СТ <i>С</i>	08° 24' 18,306" S	Sui Island	Utilization Dlash					
510	121° 3' 29,516" E	Sui Island	Utilization Block					
от 7	08° 23' 23,839" S	Destan a Islan d	Litilization Disals					
51 /	121° 3' 43,590" E	Rutong Island	Utilization Block					
CT O	08° 24' 8,050" S	Sui Island	Traditional Plast					
51.0	121° 2' 52,871" E	Sui Island	I raditional Block					

Table 1. Research station coordinates.

Data analysis **Coral Reef Data Analysis**

The percentage of cover of live coral, dead coral and other types of lifeforms is calculated using the formula (English et. al., 1997):

$$C = \frac{\alpha}{A} \times 100\%$$

Description:

- C = Percentage of lifeform i coverage
- α = Length of lifeform i transect
- A = Total length of transect

Table 2. Coral reef ecosystem assessment criteria.							
Parameter Coral Reef Damage Standard Criteria (
Percentage of Living Coral Reef Coverage Area	Bad	Damaged	0 - 24,9				
		Medium	25 - 49,9				
	Cood	Good	50 - 74,9				
	0000	Very good	75 - 100				

Environmental Ministerial Decree No. 4 year 2001

Coral Fish Community Analysis Diversity Index (H')

$$\mathbf{H}' = \sum_{i=1}^{s} \mathbf{p} i \ln \mathbf{p} i$$

Description:

- H' = diversity index.
- s = number of coral fish species.
- p = proportion of the number of individuals in coral fish species.

The diversity index is calculated using the criteria according to Brower & Zar (1977):

a. H' \leq 2.30: low diversity, very strong environmental pressure.

b. 2.30 <H' \leq 3.30: moderate diversity, moderate environmental pressure

c. H'> 3.30: high diversity, ecosystem balance occurs

Uniformity Index (E)

$$\mathbf{E} = \frac{\mathbf{H}}{\mathbf{H}\mathbf{m}\mathbf{a}\mathbf{x}}$$

Description:

- E = uniformity index
- Hmax = species balance in maximum equilibrium = $\ln s$
- The index value ranges from 0 1 with the criteria (Brower & Zar, 1977):
- $E \leq 0.4$: low uniformity, stressed community
- $0.4 < E \leq 0.6$: moderate uniformity, unstable community

E > 0.6: high uniformity, stable community

Dominance Index C'

$$C = \sum_{i=1}^{s} pi^2$$

Description:

- C = dominance index
- Pi = proportion of the number of individuals in coral fish species
- s = number of coral fish species

According to Odum (1993) the dominance index value ranges from 0-1 with the criteria that if the dominance index approaches zero it means that there is no species that dominates the station or is in a stable state, if the dominance index approaches 1 then there is a species that dominates the station or the state is unstable.

Abundance of Coral Fish

The abundance of coral fish is calculated using the equation below (Giyanto et al., 1994):

$$N=\frac{ni}{A}$$

Description:

- N is the abundance of fish (ind/m)
- ni is the number of individuals to-I; and •
- A is the area (m2)

Water Brightness Data Analysis

Brightness measurements obtained using a Secchi disk (in meters) are processed to obtain a percentage value (%) of water brightness using the equation;

$$I = \frac{\left(\frac{(H_1 + H_2)}{2}\right)}{H_{tot}} \times 100\%$$

Description:

- I = water clarity (%)
- H1 = depth of secchi disk until invisible (m)
- H2 = depth of secchi disk when visible (m)
- Htot = total depth of water (m)

RESULT

The 17 Islands Marine Nature Tourism Park (TWAL) is administratively included in the Riung sub-district of Ngada Regency which coastal villages, includes 6 namely: Lengkosambi Village, Tadho, Latung. Sambinasi, East Lengkosambi and West Lengkosambi and 2 sub-districts, namely Benteng Tengah and Nangamese. Administratively, the management is at the Riung resort, Conservation Section Region III, Ruteng Region II Division at the NTT KSDA Center. TWAL 17 Island in Riung District, Ngada Regency, which is on the north coast of Flores Island, also offers marine tourism that can spoil the eves with its cluster of small islands and white sandy beaches. Not only marine tourism, TWAL 17 Island is also part of the world's coral triangle, the turquoise sea water combines with the white sand of the beach, and the mangrove stretches are interconnected so that they support life, especially the underwater world. From the results of the research that has been conducted, it shows that there are 20 forms of life forms consisting of 4 forms of Acropora coral lifeforms at the research location, namely: Acroporal Coral Digitate (ACD), Acroporal Coral branching (ACB) and Acropora Coral Tabulate (ACT), Acropora Coral Encrusting (ACE) and 6 forms of Non-Acropora namely Coral branching (CB), Coral massive (CM), Coral encrusting (CE), Coral foliose (CF), Coral Mushroom (CMR), Coral Heliopora (CHL), 1 form of Dead Scleractinia namely DC with algae (DCA), 3 forms of Algae namely Macro Algae (MA) and Corralline Algae (CA), Halimidae Algae (HA), 4 forms of Other Fauna namely; Soft Coral (SC), Spoonge (SP), Zoanthids (ZO) and Others (OT) while for Abioic there are 2 forms namely: Sand (S), Rubble (R).

The Acroporal Coral Digitate (ACD) lifeform is only found at observation station 4 and observation station 8 (ST 4 and ST 8), while Acroporal Coral Branching (ACB) has this lifeform in almost all observation stations except at Observation Station 8 (ST 8) whereas Acropora Tabulate (ACT) is found in all stations except at observation station 5 and observation station 7 (ST 5 and ST 7), this is because this form of Acropora Coral Branching (ACB) grows faster than the others. According to the results of growth rate measurements in Khasanah's research (2020), Acropora formosa has the highest growth rate of 1,958 cm / month. Acropora intermedia 1,730 cm / month, Acropora pulchra 0,958 cm / month, and 0,756 cm / month for Acropora gomezi. Meanwhile, according to Suharsono 1998, the growth of branching coral such as Acropora has a growth speed of between 10-15 cm per year. While massive corals generally grow very slowly, which is around 0.8-1.0 cm per year. Overall, the condition of coral reefs based on lifeforms in the TWAL 17 Island waters in Riung District, Ngada Regency, East Nusa Tenggara Province is presented in full in Table 3 below:

Table 3. Coral Reef Conditions at Each Research Station.

Category		ST 1	ST 2	ST 3	ST 4	ST 5	ST 6	ST 7	ST 8
Hard Coral (Acropora)	Digitate	-	Х	-	-	-	-	-	Х
	Branching	Х	Х	Х	Х	Х	Х	Х	-
	Tabulate	Х	Х	Х	Х	-	Х	-	Х
	Encrusting	-	-	Х	-	-	-	-	-

	Sub Massive	-	-	-	-	-	-	-	-
	Branching	Х	Х	Х	Х	Х	Х	Х	Х
	Massive	Х	Х	Х	Х	Х	Х	Х	Х
	Encrusting	Х	Х	Х	Х	Х	Х	Х	-
Hard Coral (Non	Sub Massive	-	-	-	-	-	-	-	-
Acropora)	Foliose	Х	Х	-	-	Х	Х	Х	Х
	Mushroom	Х	Х	Х	Х	Х	Х	Х	Х
	Meliopora	-	-	-	-	-	-	-	-
	Heliopora	Х	Х	Х	Х	-	-	Х	-
Dood Salamatinia	Dead coral	-	-	-	-	-	-	-	-
Dead Scieractinia	DC with algae	Х	Х	Х	Х	Х	Х	Х	Х
	Macro	Х	-	-	-	-	-	-	Х
	Turf	-	-	-	-	-	-	-	-
A1999	Corralline	-	Х	Х	Х	-	-	-	-
Algae	Halimidae	Х	-	-	Х	-	-	-	-
	Alga								
	Assemblage	-	-	-	-	-	-	-	-
	Soft Coral	Х	Х	Х	Х	Х	Х	Х	Х
Other Found	Spoonge	-	-	-	-	Х	Х	Х	-
Other Faulta	Zoanthids	-	Х	-	-	Х	Х	Х	-
	Others	Х	Х	Х	Х	Х	Х	Х	Х
	Sand	Х	Х	Х	Х	Х	Х	Х	-
	Rubble	Х	Х	Х	Х	Х	Х	Х	Х
Abiotic	Silt	-	-	-	-	-	-	-	-
	Water	-	-	-	-	-	-	-	-
	Rock	-	-	-	-	-	-	-	-

The percentage of coral cover at the research location based on lifeforms at each station on each transect is presented in the following Figure:



Figure 2. Percentage of Coral Cover Based on Lifeform in the Waters of TWAL 17 Islands, Riung District, Ngada Regency, East Nusa Tenggara Province.

The distribution of coral cover based on life form can be seen below:



Figure 3. Distribution of Coral Cover in the Waters of TWAL 17 Islands, Riung District, Ngada Regency, East Nusa Tenggara Province.

Based on research results on coral cover categories at the research location based on Minister of Environment Decree No. 4 of 2001 stated that the condition of coral reefs around the waters of TWAL 17 Island ranges from moderate to good. When comparing the condition of coral reef cover in TWAL 17 Islands with the condition of coral reef cover in Sungai Cuka Village, Kintap Regency, Tanah Laut Regency, South Kalimantan Province, where the condition varies from damaged to moderate (Tony, F., et al., 2021), the condition of coral cover in TWAL 17 Islands tends to be better. For more details, the percentage of live coral cover in TWAL 17 Islands is presented in the following Figure;

Table 4. Live Coral Cove	er (%) based on Minis	ster of Environment l	Decree No. 4 of 2001
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Observation	ST 1	ST 2	ST 3	ST 4	ST 5	ST 6	ST 7	ST 8
Live Coral Cover (%)	41.41	56.68	60.55	57.81	58.16	67.75	68.24	33.44
Category based on Decree of the Minister of Environment No. 4 of 2001	Medium	Good	Good	Good	Good	Good	Good	Medium

The lowest percentage of live coral cover was at station 8, namely only 33.44% in the medium category, while the highest was at station 7, namely 68.24% in the good category. For more details, the percentage of live coral cover is presented in the following Figure.



Figure 4. Live Coral Cover (%) at Each Station in the TWAL 17 Island Waters Area, Riung District, Ngada Regency, East Nusa Tenggara Province.

Based on the results of the analysis of the diversity index values at all stations, it shows that the highest diversity is at station 2 with a value of 2.41, so if $2.30 < H' \le 3.30$ then the research location has moderate diversity, moderate environmental pressure. The uniformity index value (E') shows that there is no value smaller than 0.6 or all locations have a uniformity value (E') > 0.6 so that the research location shows that the uniformity is

high, the community is stable, while the dominance index (C ') the value ranges from 0.11 to 0.14, because there is no value close to 1, meaning there is no tendency for one individual to dominate another.

The results of calculating the Diversity index (H') and Uniformity index (E), as well as Dominance (C') values for coral reefs in each transect at each station at the research location are presented in Figure 5 below.



Figure 5. Value of Diversity Index (H'), Uniformity (E') and Dominance (C') of Coral Reefs in the Waters of TWAL 17 Islands, Riung District, Ngada Regency, East Nusa Tenggara Province.

Based on research results, the total number of coral fish species recorded was 96 species from 18 families spread across 8 observation stations. The largest fish composition is from the Pomacentridae (14 Species) and Labridae (14 Species) families, while Lutjanidae (13 Species), Chaetodonthidae (12 Species), Scaridae (6 Species), Haemulidae (6 Species). Serranidae (6 Species), Caesionidae (5 Species), Pomacanthidae (4 Species), Achanturidae (4 Species), Nemipteridae (4 Species), Holocentridae (2 Species) and Pseudochromidae (1 Species), Platacidae (1 Species), Antennaridae (1 Species), Mullidae (1 Species), Muraenidae (1 Species) and Plotosidae (1 Species)

The results of this study indicate that the Pomacentridae and Labridae families occupy the top position in terms of the number of species (biodiversity), namely 14 species, while the lowest are Pseudochromidae, Platacidae. Antennaridae, Mullidae, Muraenidae and Plotosidae each with 1 Species. Meanwhile, the highest individual abundance was also in the Pomacentridae fish tribe with 10930, while Labridae was 2570 and the lowest was the Muraenidae fish tribe with 6 types of Gimnothoraks meleagris found in ST 3, ST4 and ST 7. The types and number of species and number of individual coral fish could be found. seen in the following table.

Table 5. Families, sp	becies and numbers	of coral fish.
Name of tribe and type of fish	Species Number	Amount of Abundance
MAJOR		
Pomacentridae	14	10930
Labridae	14	2570
Pomacanthidae	4	647
Pseudochromidae	1	296
Platacidae	1	80
Scaridae	6	912

Table 5. Families, species and numbers of coral fish.

TARGET		
Achanturidae	4	114
Antennaridae	1	42
Caesionidae	5	1650
Haemulidae	6	1100
Holocentridae	2	524
Lutjanidae	13	2760
Mullidae	1	110
Muraenidae	1	6
Nemipteridae	4	652
Plotosidae	1	318
Serranidae	6	824
INDICATOR		
Chaetodonthidae	12	1370
Total	96	24905

Based on abundance data per station, it is known that ST 7 has the highest abundance compared to other stations, namely 10.04 Ind/m2, while the lowest is at ST 8, namely 3.82 Ind/m2. While at stations 1, 2, 3, 4, 5 and 6, respectively, 7.47 ind/m2, 6.03 ind/m2, 5.94 ind/m2, 5.85 ind/m2, 5.52 ind/m2, and 5.14 ind/m2. The abundance of coral fish at each station during observations in the TWAL 17 Island Water Area, Riung District, Ngada Regency, East Nusa Tenggara Province can be seen in the following figure;



Figure 6. Abundance of coral fish at each station (Ind/m2) in the TWAL 17 Island Water Area, Riung District, Ngada Regency, East Nusa Tenggara Province.

From the results of observations, it shows that there are different numbers of fish at all stations, whether in the categories of major fish, target fish or indicator fish. The major fish category has the highest number at station 7, which is 3055 individuals followed by station 1 with 2417 individuals and the lowest number at station 8 with 1175 individuals. The same results were shown in the target fish category with the highest number at station 7 with 1684 individuals, followed by station 1 with 1127 individuals, while the lowest number was at station 8 with a total of 640 fish. The indicator fish category shows the highest number at station 7 with 280 individuals followed by station 1 with 193 individuals, while the lowest number is at station 8 with 96 individuals. Station 7, which showed the highest results, both in total and in the number of each category of

fish, is thought to be due to the environment, especially coral cover, which is more supportive than other stations, one of which is coral reef cover which is a fish habitat (Syms and Jones, 2000). This is in line with the existence of ST 7 in coral cover, which is 68.24% with a good category.



Figure 7. Number of Individual Coral Fish at Each Station in the TWAL 17 Island Water Area, Riung District, Ngada Regency, East Nusa Tenggara Province.

Variations in the number of coral fish species at each station with the highest number of species found at station 7 in the categories of major fish (40 species), target fish (43 species), or indicator fish (12 species). This is directly proportional to the number of individuals found at station 7. Meanwhile, station 8 has the lowest number of species compared to other stations. In the major fish category (35 species), target fish (35 species) and indicator fish (12 species) all stations have the same number but the abundance of individuals is different.



Figure 8. Number of Coral Fish Species at Each Station in the TWAL 17 Island Waters Area, Riung District, Ngada Regency, East Nusa Tenggara Province.

From the data obtained, it can be concluded that the abundance of individuals and species is presented in the following Figure:



Figure 9. Abundance of individuals and species of coral fish at each station in the waters of TWAL 17 Pulau, Riung District, Ngada Regency, East Nusa Tenggara Province.

The coral fish community can also be measured through several indices, including the diversity index (H'), uniformity (E) and dominance (C) of coral fish (Hill & Wilkinson, 2004). The values and criteria of the dominance index (C), uniformity index (E') and uniformity index (H') of coral fish can be seen in Table 6 below.

Table 6. Values and criteria of Diversity Index (H'), Evenness Index (E'), Dominance Index (C) and Abundance Value of coral fish (Ind/m¬2).

	Diversity		Uniformit	y	Dominance		
Station	Value H'	Value	Value E!	Value	Value C	Value	
		Criteria	value L	Criteria	value C	Criteria	
1	4.02	High	0.89	High, Stable	0.03	None	
2	4.09	High	0.91	High, Stable	0.03	None	
3	4.17	High	0.92	High, Stable	0.02	None	
4	4.17	High	0.92	High, Stable	0.02	None	
5	4.15	High	0.92	High, Stable	0.02	None	
6	4.12	High	0.91	High, Stable	0.02	None	
7	4.18	High	0.92	High, Stable	0.02	None	
8	4.04	High	0.92	High, Stable	0.02	None	

The abundance values (N), dominance index (C), uniformity index (E) and diversity index (H) of coral fish at each station can be seen in the following figure;



Figure 10. The value of diversity index (H), uniformity index (E), dominance index (C) and abundance (N) of coral fish at each station in the waters of TWAL 17 Islands, Riung District, Ngada Regency, East Nusa Tenggara Province.

This figure shows the variation of several coral fish ecological indices, namely the diversity index (H'), uniformity (E), and dominance (C). All observation stations found that the coral fish diversity index was in the high category and there was an ecosystem balance, with high uniformity and a stable community and no one fish species dominating other individuals. The high and low diversity values of coral fish are influenced by several factors, including the physico-chemical conditions of the waters and the condition of the coral reef ecosystem which is the habitat of coral fish. The level of diversity of a biota is categorized as high if the number of species with the number of individuals of each species is relatively even (Syms & Jones, 2000). The results of the uniformity index calculation show variable values ranging from 0.89 - 0.92. The uniformity index value shown at all stations is included in the high category and the community is stable with a value above 0.6 (Brower & Zar, 1977). If the community uniformity index value is lower, the lower the community uniformity in an ecosystem. This can also be caused by the presence of biota that dominates an ecosystem. The greater the uniformity value of a biota indicates that the community is stable, that is, the waters have the same type of biota or are not much different (Pratchett et al. 2011).

The dominance index value ranges from 0 - 1, which means that if the value approaches 1, there is a tendency for one individual to dominate the others, while the average Dominance Index (D) value at 8 observation stations is in the category ranging from 0.02 to 0.003. the smaller the dominance index value, it indicates that there is no species that dominates, conversely the greater the dominance, it indicates that there is a certain species (Odum, 1993).

The results of the dominance index calculation also have values that are almost not much different, between 0.02 - 0.03, but the index values at all stations are included in the same category, namely the low category with values below 0.5 (Howard et al., 2009). A low dominance value causes a high

uniformity value in an ecosystem, as is the case when monitoring marine biota in the waters of TWAL 17 Island, Riung District, Ngada Regency, East Nusa Tenggara Province.

CONCLUSION

The coral species found in the TWAL 17 Islands area of Riung District, Ngada Regency, East Nusa Tenggara, consist of 4 lifeforms Acropora (Acropora Coral Coral Digitate, Acropora Branching, Acropora Coral Tabulate, and Acropora Coral Encrusting) and 6 Non-Acropora forms. Additionally, there is one Dead Scleractinia form, three types of algae, and four other fauna forms, along with two abiotic forms (sand and rubble). A total of 96 reef fish species from 18 families were recorded across 8 observation stations, with the Pomacentridae and Labridae families having the highest diversity.

The condition of coral cover in the TWAL 17 Islands area is rated from moderate to good.

The coral reef biodiversity index in the TWAL 17 Islands area indicates moderate diversity with moderate environmental pressure, high uniformity, and a stable community without dominance by any single species. Reef fish biodiversity across observation stations falls into the high category, indicating ecosystem balance, high species uniformity, and a stable community with no dominant fish species. The study provides data on coral and reef fish species, coral cover conditions, and indices of diversity, uniformity, and dominance in the TWAL 17 Islands.

Declaration by Authors

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