World Journal of Pharmaceutical and Life Sciences
WJPLS

www.wjpls.org

SJIF Impact Factor: 5.088

COMPOSITION AND COMMUNITIES STRUCTURE OF CHAETODONTIDAE AT PASUMPAHAN ISLAND, PADANG CITY

*Hidayatul Annisa M. Si, Dr. Indra Junaidi Zakaria and Dr. Syaifullah

Department of Biology, Faculty of Mathematics and Natural Science, Andalas University.

*Corresponding Author: Hidayatul Annisa M. Si

Department of Biology, Faculty of Mathematics and Natural Science, Andalas University.

ABSTRACT

Family Chaetodontidae have been regularly identified as indicator species of coral reef health with almost a quarter of the species feeding on polyps coral. This study was conducted in September – October 2018 in Pasumpahan Island, Padang City. This study aimed to determine composition and comunity structure of Chaetodontidae and the research used underwater fish visual cencus method with limitation of 2.5 meters of view to the left and to the right along the line transects on coral reef. The results found that 5 species of Chaetodontidae fish which belong to two genera; Heniochus and Chaetodon. There were three species of Chaetodontidae (i.e *Chaetodon triangulum, C. vagabundus* and *C. trifasciatus*) and two species of Heniochus (i.e *Heniochus pleurotaenia* and *H. singularis*). Diversity index ranged between 0.31-0.97 showed low diversity. Dominance Index was low categorized with value between 0.037-0.076. Similarity index are low categorized with value between 0.16-0.80. The low index values for all of the parameters may indicate a low quality of the coastal area community due to the human interferences.

KEYWORDS: Chaetodontidae, composition, comunity structure, Pasumpahan Island.

INTRODUCTION

Pasumpahan Island is located in Bungus Teluk Kabung District, Padang City is one of marine tourism destinations that has potential coastal and has a beautiful island. There was increased the number of tourists came to Pasumpahan Island every year. However, according to Wijaya, Thamrin and Nasution (2016), some tourism activities and fishing couse serius damage to coral reefs on Pasumpahan Island resulting degradation for many years. The abundance of reef fish species depends on condition of coral reef. Therefore, each coral reef area should have a management plant and ecological monitor of coral reef ecosystems.

Chaetodontidae family is closely assosiated with coral reef and indicators of coral reef health because some taxa feed on Scleractinia (Glynn, 1990). Chaetodontidae has wide variety of foods including algae, polychaeta, crustacea, sponges and alcytaceans. However, Chaetodontidae feed almost exclusively on sclerectinisn coral and many species feed on life tissues of coral (Pratchett, 2005). Therefore, Chaetodontidae family group have strong associations with coral and can be used as an indicator of coral health. Base on these reason, Chaetodontidae has been used as a bio-indicator of coral reef healt condition. Total number of Chaetodontidae species have significant correlation to hard coral coverage.

Obligate coral feeders such as many members of the Chaetodontidae family often show strong preferencec for particural coral species and sensitive to changes in environmental conditions. In addition, Chaetodontidae spesies actively defend its feedeng territory as a pair and it easy to monitor them regularly. The territory of Chaetodontidae depended on aviabillity of coral. Where food supply is scarce, dietary specialisation is minimized and territory size increased. They would expand their territory and moved to coral reef area with good conditions (Crosby and Reese, 1996). The social behavior changes of Chaetodontidae was proved as indication the instability and changes occur in coral reef ecosystems.

The condition of coral reefs was important to illustrates the high diversity and abundance of reef fish. When coral reefs were damaged, they will lose their ecological and biological functions. To avoid degradation of coral reef ecosystem due to human activity or natural factors, it is necessary to manage coral reef ecosystems. The first step was monitoring the condition of coral reef. Surveying and monitoring where essential to understand the extent of the problem facing coral reefs. Interaction between Chaetodontidae with coral reefs can used as a reference for determining the condition of coral reefs and other factors. The study were aimed to determine community structure of the family Chaetodontidae on Pasumpahan

Island, Padang City and can used as a baseline data for sustaible management of coral reefs ecosystem.

METHODS AND MATERIAL

a. Study area
This study was conducted at Pasumpahan Island, Padang City from September to October 2018. Data were collected from 3 stations: Northeast, East and Shoutweast which represesnts the condition on Pasumpahan Island.

b. Tools and Materials
This study were used roll meters, stationary underwater, GPS (global possitioning system), underwater camera, SCUBA (selft contain underwater breathing aparatus), boat and fish identification was done using guides from Allen et al., (2003), Setiawan (2010) and Kuiter (1992).

c. Methods
Reef fish research method was used is an underwater fish visual census (Underwater Visual Census, UVC) to follow English *et al.,* (1994) methods. 20 meters transects were made parallel to the coastline, with a distance of observation as far as five meters left and right of the transect line. It has two replicate for each location. Transect lines were placed at a depth of 3 and 5 meters. The fish were encountered and enumerated types observed along the transect line. To complete the data, also observed by taking under water photos. Re-identification of fish also conducted follow methods development by Allen et al., (2003), Setiawan (2010) and Kuiter (1992). Observers swim slowly on the transect and record the number and types of Chaetodontidae was found. Data were analyzed using Shannon-Wiener diversity index (H), dominance index (C) and similarity indexis (S) based chetodontidae composition per site.

RESULT AND DISCUSSION

a. Composition, relative frequency and relative abundance of Chaetodontidae on Pasumpahan Island
Based on research was done in northeast, east and shoutweast of Pasumpahan Island there were 5 Chaetodontidae from 2 genera were found; *Chaetodon* 3 species (*Chaetodon triangulum, C. trifasciatus, C. vagabundus*) and *Heniochus* 2 species (*Heniochus pleurotaenia* and *H. singularis*) (Tbael 1). There are differences on the number of fish found in each station. The highest diversity was obtained from station 3 in Shouthweast of Pasumpahan Island with 5 species. In northeast was found only one species i.e *H. leurotaenia* with relative frequency 100 % and abundance were 0.035. All species were found at stasiun shouthweast and two species were found at east.

Table 1: Composition, relative frequency and relative abundance of Chaetodontidae at Pasumpahan Island.

No	Species	Northeast		East		Shoutweast	
		RF (%)	RA	RF (%)	RA	RF (%)	RA
1	*C. triangulum*	-	-	-	-	50	0.15
2	*C. trifasciatus*	-	-	100	0.3	25	0.1
3	*C. vagabundus*	-	-	-	-	25	0.05
4	*H. singularis*	-	-	-	-	25	0.1
5	*H. pleurotaenia*	100	0.35	66.7	0.3	25	0.45
Relative abundance			0.35		0.6		0.85

Explanation: (-) : no species found.

In southwestern part of the island has low level currents and good coral reef conditions. That station has highest abundance of Chaetodontidae compared to the other stations with relative abundance value was 0.85 individu/300 m2. Based on Wijaya *et al.* (2016), in the southwestern of Pasumpahan Island has persent coral reef cover with good category (69.95%). High percent cover of live coral can attrack fish to appears in the area. Based on the correlation analysis between fish abundance value and coral reef coverage percentage have positive relationship. The correlation between the complexity of coral reef types and the diversity of fish communities indicates that the structure of the reef fish community can be affected by the physical complexity of the substrate.

Based on Tabel 1 *H. pleurotaenia* appears on all stations with the highest abundance at the southwest with value is 0.45. *H. pleurotaenia* were found in almost every transect and living in groups and has higher abundance.

According to Setiawan (2010), generally *H. pleurotaenia* is a solitary fish but it can live in pairs or even in small groups at depth of 1-25 m. This fish is facultative coral feeder so it has many alternative foods besides corals such as benthic, algae and invertebrates. Therefore *H. pleurotaenia* is easy to find because it is resistant to various changes in environmental conditions that can still be tolerated in the waters (Pratchett, 2007).

The number of Chaetodontidae fish species that occupy coral reefs depends on coral reefs as a place of refuge and as a food source. The natural condition of coral reefs also affects the number of individuals and the composition of fish species that can live in the area (Desmaulien, 2011). From the research of Zekeria and Viedeler (2000), it shows that the abundance of some Chaetodontidae species has a strong relationship with hard coral cover (Sclerectinia) in Red Lut and based on research by Mujiyanto, Sugianti and Hartati (2011) that, the higher the percentage of eating coral cover the higher

abundance of Chaetodontidae fish. Low abundance indicates damage to coral reefs. According to Marsaoli (1998), the abundance of coral-eating fish lives high and decreases in line with the magnitude of changes in coral cover. This is because high live coral cover provides large amounts of feed so that reef eaters easily get feed for the needs of population growth and development

b. Diversity Index (H'), Dominance Index (C) and Similarity Index (S) of Chaetodontidae at Pasumpahan Island

Diversity index (H'), Dominance index (C) and Similarity Index (S) were indicated the stability the number of individual each station that showed by richnes (Odum, 1993). The result of data analysis for diversity index (H'), dominance index (C) and similarity Index (S) of Chaetodontidae at Pasumpahan Island can see in Tabel 2.

Tabel 2: Diversity index (H'), Dominance index (C) and Similarity Index (S) of Chaetodontidae at Pasumpahan Island.

Station	Community		
	H'	E	D
Northeast	0.31	0.16	0.037
East	0.59	0.33	0.05
Shoutweast	0.97	0.80	0.076

Diversity index (H ') reef fish is a parameter to measure the size of the diversity of a species in a location. The diversity index obtained at the study sites ranged from 0.31-0.97 with high diversity at the southwest station (Table 2). In general, the diversity index value of Chaetodontidae fish on Pasumpahan Island is 0.62 and is in the category of low diversity. According to Brower and Zar (1977), the value of the diversity index is low if the value obtained is <1. The diversity of reef fish is characterized by species diversity. One of the causes of high species diversity is due to the condition of coral reefs (Bauchon-Novaro et al., 1985).

The main factor affecting the diversity of Chaetodontidae is the basic substrate composition which is an indicator of the presence of fish. Based on the results of direct observations in the field, it was shown that the station which had the composition of the base substrate which was dominated by branching corals had a higher number and diversity while in Pasumpahan Island it was dominated by massive coral. This is in accordance with the research conducted by Williams (1982) that, Chaetodontidae fish are richer in their species in coral reefs dominated by Acropora species (*Acropora palifera* and *A. hyacinthus* which are long branching corals) on the Great Barrier Reef.

The similarity index was value that showed the stability of the number of individual per genus. 0.16-0.80 with an average of 0.43 and this indicates low uniformity. According to Brower and Zar (1977) that, the spread of

the number of individuals on each station is uneven and the condition of the community is depressed with the uniformity index value <0.50.

The dominance index value of data processing varies between 0.037-0.076 with an average value of each station 0.054. These results indicate that no species dominates. Based on Simpson's dominance index the index value of 0.75-100 indicates that there are species that dominate. From the data shown in Table 1 there are species whose individual numbers are found in all research stations, namely *Heniochus pleurotaenia.* Overall this species does not dominate because of the small number of individuals at several stations. According to White (1988), the total number of Chaetodontidae species showed a significant correlation to Sclerectinian cover. This is consistent with the results of the study carried out by Bawole (1998) which showed that the variation of Chaetodontidae fish was determined by the form of branching acropora, branched non-acropora, massive non-acropora, non-acropora encrusting and diverse habitat.

CONCLUSION

Based on data analysis in this study showed that the abundance of Chaetodontidae on Pasumpahan Island was low with species found, 3 species from Chaetodon genera namely *Chaetodon triangulum, C. vagabundus, C. trifasciatus* and 2 genera from Heniochus namely *Heniochus pleurotaenia* and *H. singularis*. High abundance of Chaetodontidae species among 3 stations is in the West part of Pasumpahan Island with an average abundance of 0.85. This is influenced by the condition of the coral reefs at each station. Site with good coral reef conditions will provide the food source needed by Chaetodontidae as Coralivorus. The analysis of the diversity index (H') at each station was showed that diversity result were low diversity with an average value obtained 0.62 and similarity index value is also low 0.43 which indicates an uneven distribution of individuals. The dominance index value is between 0.037-0,076 with an average value of each station 0.054 indicating that no species dominates.

REFERENCES

1. Brower JR dan Zar JH. Field and Laboratory Methods for General Ecology. Dubugue Iowa, 1977.
2. Bauchon-Novaro Y, Bauchon C, Harmelin-Vivien ML. Proceeding of the 5th International Coral Reef Congress, 1985; (5): 427-432.
3. Bawole R, Eidman M, Bengen DG, Suharsono. Jurnal Ilmu-Ilmu Perairan dan Perikanan Indonesia, 1998; 6(1): 1-13.
4. Crosby, M. P. dan E. S. Reese. *A Manual For Monitoring Coral Reffs With Indicator Species : Butterflyfishes as Indicator of Change on Indon Pacific Reefs*. Office of Occan and Coastal Resourse Management, National Occanic and Atmospheric Administration. Silver Spring, 1996; 45.

5. Desmaulien, Komunitas Ikan Kepe- kepe (Chaetodontidae) di Kawasan Terumbu Karang Pulau Pieh Propinsi Sumatra Barat. Skripsi. Sarjana Biologi Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Andalas, 2011.

6. English S., C. Wilkinson dan V. Baker. *Survey Manual for Tropical Marine Resources*. 7 Townsville: Australian Institute of Marine Science, 1994.

7. Glynn PW. Ecosystem of the World 25. Coral Reef, 1990; 365-400.

8. Marsaoli, MK. Hubungan Persentase Penutupan Karang Hidup Dengan Densitas Beberapa Jenis Ikan Karang Di Perairan Kepulauan Karimunjawa, Jepara. Tesis. Institut Pertanian Bogor. Bogor, 1998.

9. Mujiyanto Y, Sugianti Y dan Hartati ST. Prosiding Seminar Nasional: Strategi Pembangunan Perikanan dan Kelautan Berwawasan Lingkungan, 2011; (1): 1-4.

10. Odum EP. Fundamentals of Ecology. W.B. Saunders Company, Philadelphia, London. Alih Bahasa oleh: Samingan T. dan B. Srigandono. Gajah Mada University Press. Yogya karta, 1993.

11. Prachett MS. *Marine Biology*, 2005; 148: 373-382.

12. Prachett MS. The Rafflesh Buletin of Zoology, 2007; 14: 171-176.

13. Setiawan F. Panduan Lapangan: Identifikasi Ikan Karang dan Invertebrata Laut Dilengkapi dengan Metode Monitoringnya. WCS Indonesia. Manado, 2010.

14. Williams DMB. Coral Reef, 1982; 2(1): 35-43.

15. White AT. Proceedings of the 6th International Coral Reef Symposium, 1988; 2.

16. Wijaya KH, Thamrin dan Nasution S. Jurnal Fakultas Perikanan dan Ilmu Kelautan, 2016; 1-13.

17. Zekeria ZA dan Videler JJ. Proceedings of the 9th International Coral Reef Symposium, 2000; 487-492.