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Analysis of Coral Reefs in Sawinggrai Village, Meosmansar District, Raja Empat Regency, West Papua Province

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Abstract

Coral reefs are unique ecosystem in tropical areas where the habitat of reef fish became a source of food and economic income for villagers. Effort to use these resources and overexploitation by human activities have been reduced its production capacity. Among many cases of destruction of the sea cause by some people, so recently various concrete actions to save them have been hold by local communities as villagers in Raja Ampat. The purpose of this study is to know how about the condition and relationship between coral reefs, reef fish and coral reef limited factors of life in Sawinggrai Village, Meosmansar District, Raja Ampat, West Papua. In general, the percentage of coral reefs dencity have a range of 24,23 to 82,33% into medium category with an average of 46,95%. Coral reefs ecosystem management efforts in Sawinggrai Village are make by the local wisdom as *Sasi* and marine protected areas. It is suggested that the government associated with the NGO makes socialization about the importance of the conservation of coral reefs and make it more intese and keep it regulary.

Key words: coral reefs, Sawinggrai Village, Raja Ampat

1. INTRODUCTION

One of the ecosystems in tropical marine waters that have high productivity are coral reefs. Coral reefs are typical ecosystems find in the tropics and it is always to define the boundaries of tropical and sub-tropical marine environments. This ecosystem has a very prominent characteristic that has high productivity and biodiversity. The magnitude of productivity of coral reefs is due to the recycling of nutrients through biological processes efficiently. Coral reef ecosystems are characterized by warm, productive and rich waters of calcium carbonate ($CaCO^3$) (Nybakken, 1992). Coral reefs and the resources within them have been exploited by the community in various ways. In the last years Indonesia's coral reef condition has declined to an alarming level due to various pressures. According to research results of Research Center for Oceanology in 1998 the condition of coral reefs in Indonesia is 6.20% in very good condition, while 70% is in medium or very bad condition. These data indicate that the condition of coral reefs in Indonesia is quite alarming and could have a negative impact on the life of the organisms associated. Healthy coral reefs can increase the percentage of coral cover and ensure the presence of reef fish and support the diversity of reef fish (National Critc, 2001). The Raja Ampat Islands are an area of immense biodiversity and marvelous marine and terrestrial habitats. Raja Ampat located in the heart of the coral triangle, an area that covers the northern part of Australia, the Philippines, Indonesia and Papua New Guinea which has the highest coral diversity in the world. It is one of the world's richest reef fish faunas composed of at least 1,074 species (REA, 2005). The purpose of this research is to know the condition of coral reefs and abundance of reef fish and the relationship between coral reefs and abundance of reef fish in Sawinggrai Village, Meosmansar District, Raja Ampat Regency, West Papua Province.

2. METHODOLOGY

The study was conducted for 90 days started from February to May 2016, located in Sawinggrai village, Meosmansar District, Raja Ampat Regency, West Papua Province. The method used in data collection is survey method, while the form of data collection activities conducted by direct observation in the field. The types of data collected include primary and secondary data. For observation of coral reef condition using Underwater Photogragpy Transect (UPT) method with transect length 50 meters and bottom depth of 7 meters water (COREMAP-CTI, 2014). Analysis of coral cover data was processed by using CPCe program (Coral Point Count with Excel extension)

Figure 1. Observation stations in Kampung Sawinggrai

3. RESULT AND DISCUSSION

Coral reef type in Kampung Sawinggrai waters is the type of edge reef (*Fringing reef*), from the direction of the coast to the tube form the exposure of the reef. The basic substrate at each observation site in the waters of Kampung Sawinggrai consists of hard coral (*Hard Coral*), Dead Coral, other benthic and abiotic

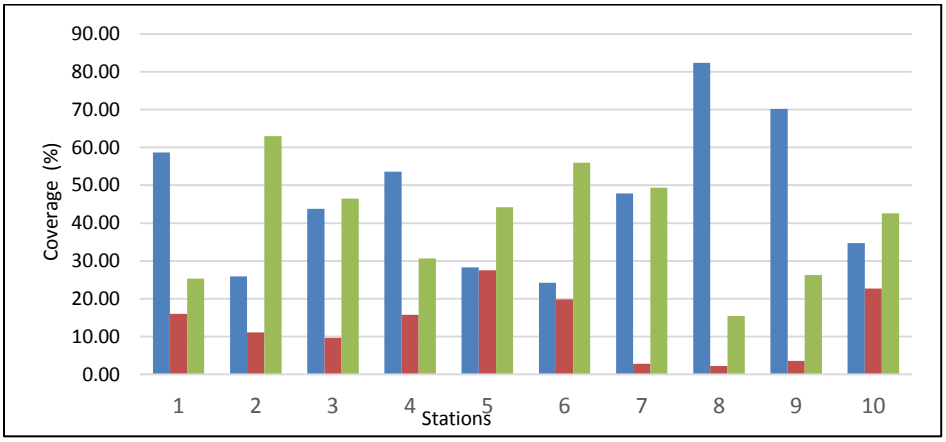


Figure 2. Coral Reef Coverage Persentations

The percentage of coral coverage in Sawinggrai village 24.23 to 82.33% fall into the category of bad, moderate, and good according to Kep-Men LH. 4th 2001. Percentage of coral coverage of bad category found at station 6th, good category on station 1st, 4th and 9th, and category is very good on station 8th. Water conditions of Kampung Sawinggrai have different percentage of coral cover on each observation stations.

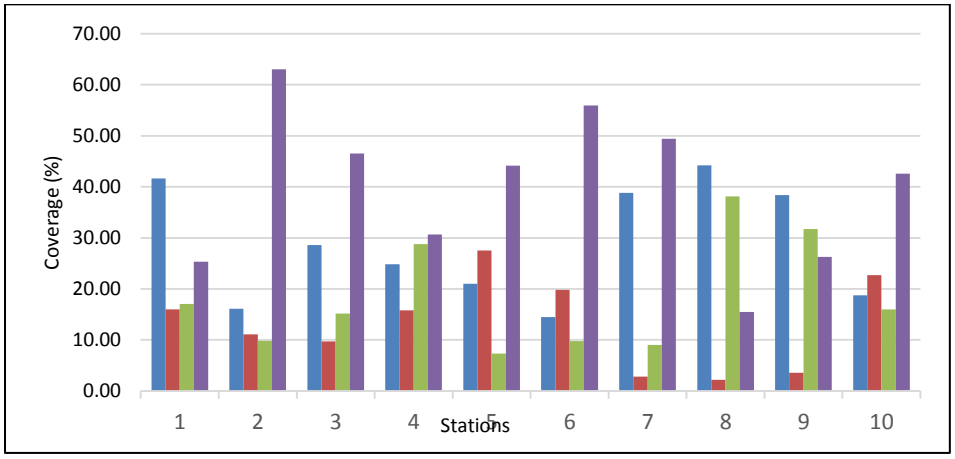


Figure 3. Lifeform Of Coral Reefs Coverage Persentations

The highest percentage of coral cover is at station 8th which is categorized as excellent. The location is also adjacent to the mangrove vegetation so that the waters are rich in nutrients. The prohibition of bameti or balobe activity of finding fish by destroying coral reefs also affects the condition of the reefs at this location, with the installation of banning boards and socialization of the community already aware of the importance of coral reefs for the survival of the fish they catch everyday

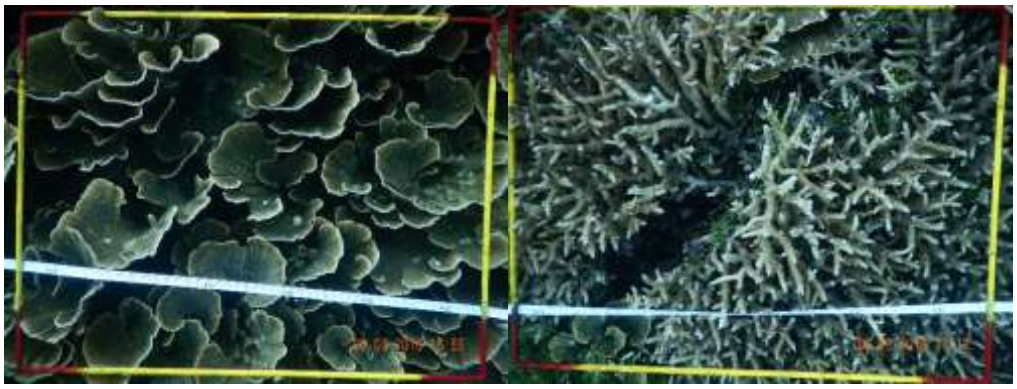


Figure 4. Condition of Coral Reef Good Category at Station 8th

Percentage of live coral cover in good category was found at station 1st, station 4th, and station 9th. At these stations located adjacent to mangrove vegetation, the coral reef condition is well and varied influenced by mangrove vegetation that grows so fertile that it is rich in nutrients that coral reefs need to grow. The percentage of live coral cover in the moderate category is at station 2nd, station 3rd, station 5th, station 7th and station 10th. At the station has strong currents and routinely exposed to waves during the southern wind season, resulting in impaired growth. Besides this location does not have a wave barrier so that strong currents and waves directly on the coral reefs. The percentage of live coral cover in the bad category is at station 6th. Bombing and bameti activities are responsible for coral destruction at this location, resulting in this station having low live coral cover. The high percentage of dead coral represents considerable pressure on coral reef ecosystems at the site. Activities anchor also affects the condition of coral reefs considering the location is adjacent to the settlement so that the main access of the boat or speedboat.

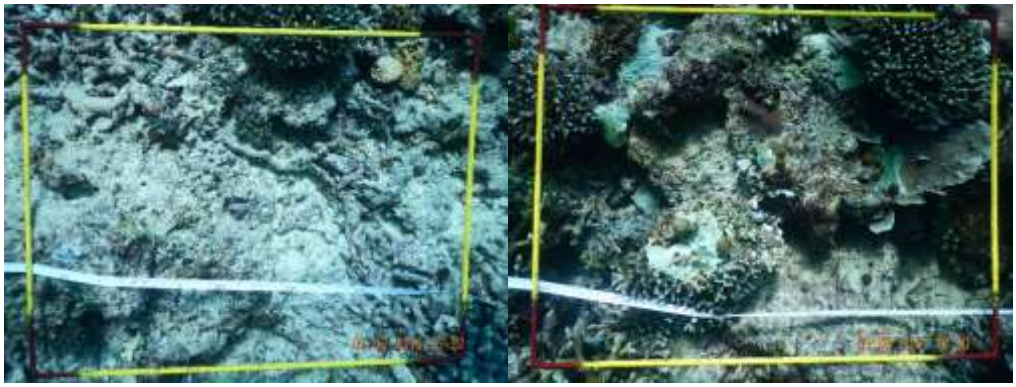
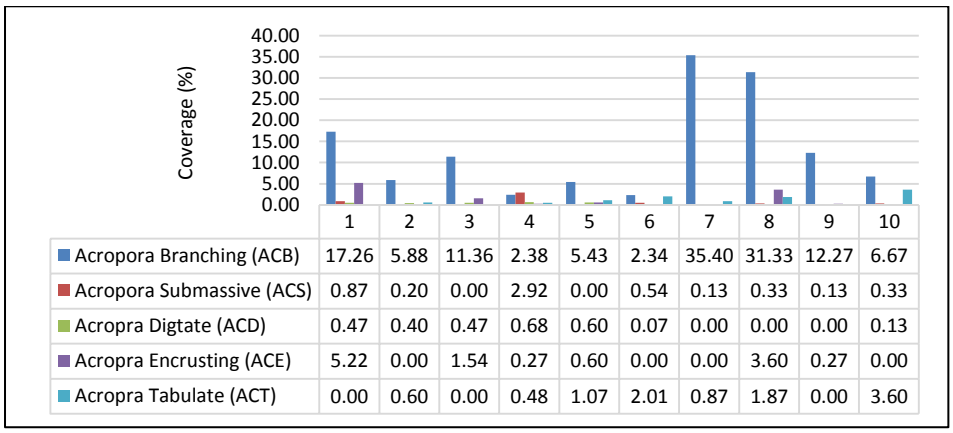


Figure 5. Dead coral with algae at station 5th

Although the live coral cover at this location is low and there is no change but actually changes over time. As Najamuddin, et al (2012) points out that corals can die and grow in a dynamic equilibrium. In the habitat of coral life there is a continuous competition of living space and adjustment (adaptation process) to the dynamics of changes in environmental factors of the habitat. Corals may change or die from the effects of large waves or human activities. Small changes or disturbances, however, can have a good effect on coral development and are important for the development of species diversity and coral colonies. The highest percentage of highest benthic biota cover was at station 8th and the lowest was at station 5th

Figure 6. Other Benthic Biota Are Found At The Observation Stasions

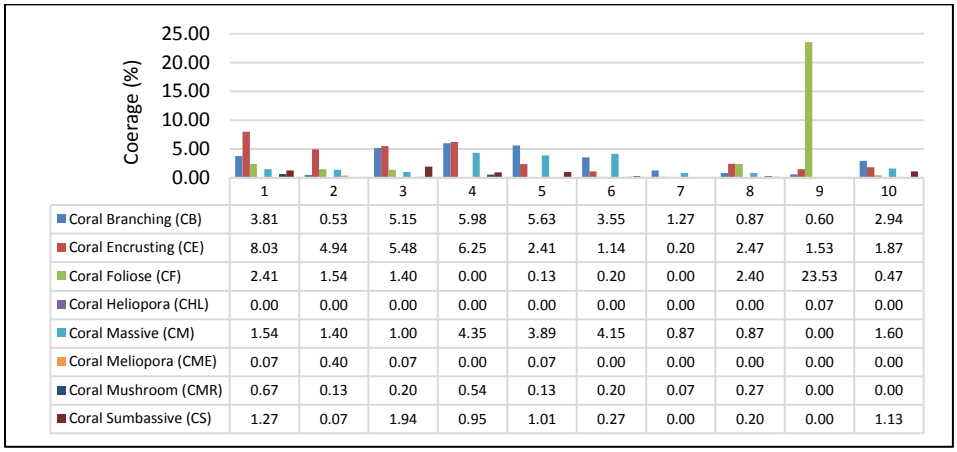
Results of hard coral analysis with lifeform form category in all observation stations of coral cover vary widely which include Acropora and Non Acropora. Acropora's Acropora Branching (ACB), Acropora Submassive (ACS), Acropora Digitate (ACD), Acropora Encrusting (ACE), Acropora Tabulate (ACT) are presented in Figure 7th



	1	2	3	4	5	6	7	8	9	10
Acropora Branching (ACB)	17.26	5.88	11.36	2.38	5.43	2.34	35.40	31.33	12.27	6.67
Acropora Submassive (ACS)	0.87	0.20	0.00	2.92	0.00	0.54	0.13	0.33	0.13	0.33
Acropra Digtate (ACD)	0.47	0.40	0.47	0.68	0.60	0.07	0.00	0.00	0.00	0.13
Acropra Encrusting (ACE)	5.22	0.00	1.54	0.27	0.60	0.00	0.00	3.60	0.27	0.00
Acropra Tabulate (ACT)	0.00	0.60	0.00	0.48	1.07	2.01	0.87	1.87	0.00	3.60

Figure 7. Lifeform Acropora Analysis

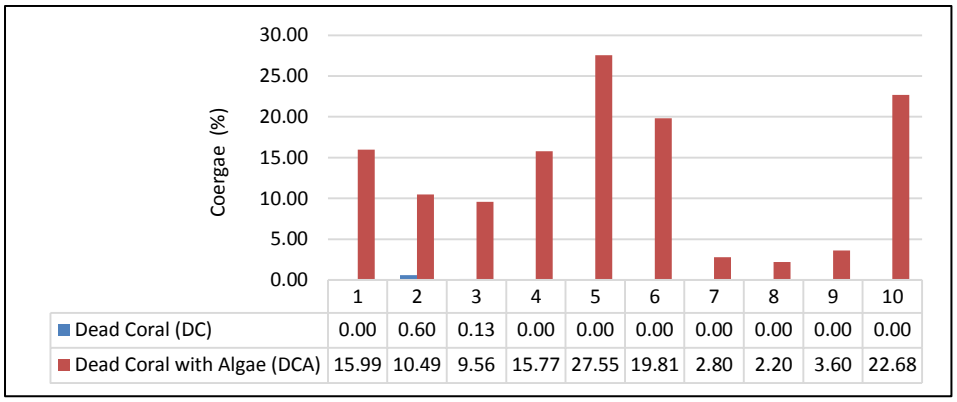
The non-Acropora lifeforms found are Coral Branching (CB), Coral Encrusting (CE), Coral Foliose (CF), Coral Massive (CM), Coral Heliopora (CHL), Coral Meliopora (CME), Coral Mushroom (CMR) and Coral Submassive (CS). The percentage of Non Acropora hard coral cover can be seen in Figure 8th



	1	2	3	4	5	6	7	8	9	10
Coral Branching (CB)	3.81	0.53	5.15	5.98	5.63	3.55	1.27	0.87	0.60	2.94
Coral Encrusting (CE)	8.03	4.94	5.48	6.25	2.41	1.14	0.20	2.47	1.53	1.87
Coral Foliose (CF)	2.41	1.54	1.40	0.00	0.13	0.20	0.00	2.40	23.53	0.47
Coral Heliopora (CHL)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00
Coral Massive (CM)	1.54	1.40	1.00	4.35	3.89	4.15	0.87	0.87	0.00	1.60
Coral Meliopora (CME)	0.07	0.40	0.07	0.00	0.07	0.00	0.00	0.00	0.00	0.00
Coral Mushroom (CMR)	0.67	0.13	0.20	0.54	0.13	0.20	0.07	0.27	0.00	0.00
Coral Sumbassive (CS)	1.27	0.07	1.94	0.95	1.01	0.27	0.00	0.20	0.00	1.13

Figure 8. Lifeform Non Acropora Analysis

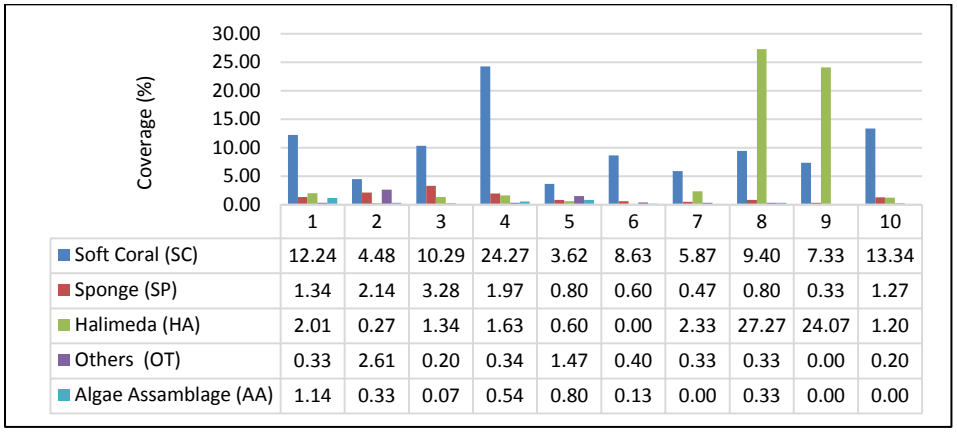
In some stations it was found that the percentage of soft coral cover or Soft Coral was higher than the percentage of hard coral cover. The low hard coral cover is caused by competition where soft corals that have a high percentage in the coral reef environment can have a negative effect on the growth and resistance of hard corals. As stated by Fabricius (1996) in Adriani (2001) that the content of suspended compounds in soft corals is toxic to other biota so that it can kill the biota. In general there are two factors that affect the damage of coral reefs in this region, namely nature and human activities. Natural factors that affect the wave and current are strong at certain times such as the southern wind season. A direct current leading to Teluk Kabui from station 10 to station 1 where there is no current barrier in the waters of Kampung Sawinggrai. The percentage of dead coral cover is shown in Figure 9th



	1	2	3	4	5	6	7	8	9	10
Dead Coral (DC)	0.00	0.60	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dead Coral with Algae (DCA)	15.99	10.49	9.56	15.77	27.55	19.81	2.80	2.20	3.60	22.68

Figure 9. Dead Coral and Dead Coral with Algeae Coverage Persentations

In general, the percentage of other benthic benthic coverings has different values, according to the circumstances and conditions of the surrounding environment. Other benthic biota include Soft Coral, Sponge, Halimeda, and Other with a percentage that can be seen in Figure 10th

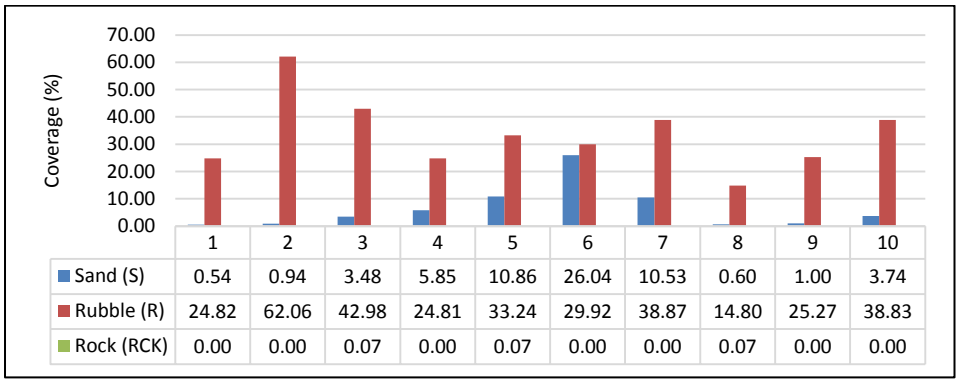


	1	2	3	4	5	6	7	8	9	10
Soft Coral (SC)	12.24	4.48	10.29	24.27	3.62	8.63	5.87	9.40	7.33	13.34
Sponge (SP)	1.34	2.14	3.28	1.97	0.80	0.60	0.47	0.80	0.33	1.27
Halimeda (HA)	2.01	0.27	1.34	1.63	0.60	0.00	2.33	27.27	24.07	1.20
Others (OT)	0.33	2.61	0.20	0.34	1.47	0.40	0.33	0.33	0.00	0.20
Algae Assamblage (AA)	1.14	0.33	0.07	0.54	0.80	0.13	0.00	0.33	0.00	0.00

Figure 10. Benthic and Other Benthic Coverage Persentations

The percentage of other benthic tends to be evenly distributed across all observation stations. Almost in all locations adjacent to mangrove vegetation so the waters are rich in nutrients needed by Soft Coral and Halimeda. Soft Coral is an organism that live colonize and sedentary (attached to substrate base of water), Soft Coral so many found and thrives in area former bombing with Rubble which have long formed and become substrate base of waters. Soft Coral found in the waters of Kampung Sawinggrai is Sarcophyton and Sinularia, these two genera have the ability to survive and thrive in high-energy waters because it has a strong basal structure attached to the substrate and has flexible body columns so it can resist strong currents with the waves that large, according to Tomascik et al., (1997) in Adriani (2001) that soft coral is an opportunistic living being when viewed from its ability to survive under stressful environmental conditions. While Manuputty (1988) in Rahman (2007) says that the number of soft corals will grow and increase along with the increase in depth, and the best depth is in the range of 5-10 meters

Abiotic components include Sand (S), Rubble (R), and Rock (RCK). The highest Sand or Sand category percentage is at station 6. Rubble (R) category percentage dominates abiotic component cover and almost all stations are Rubble with the highest percentage at station 2 and the lowest is at station 8, for more clearly seen in Figure 11th



	1	2	3	4	5	6	7	8	9	10
Sand (S)	0.54	0.94	3.48	5.85	10.86	26.04	10.53	0.60	1.00	3.74
Rubble (R)	24.82	62.06	42.98	24.81	33.24	29.92	38.87	14.80	25.27	38.83
Rock (RCK)	0.00	0.00	0.07	0.00	0.07	0.00	0.00	0.07	0.00	0.00

Figure 11. Abiotic Component Coverage Presentaions

4. CONCLUSION

In general the percentage of coral reefs coverage in Sawinggrai Village waters with a range of 24.23% - 82.33%, the medium category with an average of 46.95%. The highest percentage of coral cover is at station 8 which is categorized as excellent (44.20%). There are two factors that affect the damage of coral reefs in this region, namely nature and human activities

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