REPORT

DUGONG AND SEAGRASS IN MUNASELI VILLAGE

ALOR REGENCY, EAST NUSA TENGGARA

Juraij, Khaifin, Alexandra Maheswari, Khaifin[1], Guntur Wibowo[2], La Rodo[3], Jansens Saliana[4], Hainun, Evie, Yolanda[5]

[1]WWF-Indonesia, [2]BKKPN Kupang, [3]BPSPL Denpasar Satker Kupang, [4]Marine and Fisheries Agency of Alor Regency, [5]University of Nusa Cendana

February 2018

This Project is executed by the Mohamed bin Zayed Species Conservation Fund, with financing from the GEF, implementation support by UNEP and technical support from the CMS Dugong MoU Secretariat.

PREFACE

Praise and gratitude to The Might One God for all the graces so the survey report "Dugong and Seagrass in Munaseli Pantar Village" can be arranged completly. We also remember to say a lot of gratitude for the help of those who contributed by offering both materials and minds.

We hope that this report can be useful and beneficial, especially for Indonesia's dugong and seagrass conservation.

Apart from all that, we are fully aware that there are still imperfection both from sentence arragement and grammar. Therefore we accept all his suggestions and criticisms, to makes this report perfect.

.

Jakarta, February 2018

Writer

TABLES OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

Background

Marine and Fisheries Agency of Republic Indonesia has established the Marine Conservation Area (Kawasan Konservasi Perairan – KKP) Sea Water Sanctuary (Suaka Alam Perairan – SAP) of Pantar Strait and surrounding sea by decree number : 35/KEPMEN-KP/2015 about Marine Conservation of Pantar Strait water and surrounding sea in Alor Regency, East Nusa Tenggara Province. One of the aims of SAP management of Pantar Strait and surrounding sea is to protect endangered species, one of them is dugong. The existence of dugong in SAP Pantar Strait was known since 2009, one of them in the coastal waters of Mali Beach, Kabola Village and even already covered in some media television. In its development, the existence of dugong is also confirmed to exist in Pantar Island that have been proved by the capture of dugong in the waters of Munaseli Village in 2014 and 2016.

The waters of Munaseli Village still have potential threats to dugong through the occurrence of bycatch activities. In December 2016, there was information about the capture of this mammal by a tidal net known as a pukat sero. These nets are installed by local fishermen at the "door" or overdrafts that exist in the trasition between the deep waters, coral reefs in the cliff, with shallow waters dominated by seagrass and sand.

Munaseli Village is one of the area of SAP Pantar Strait and surrounding sea, which has occurred side catch several times. **Events by catch** occur because there are local fishermen who installed pukat sero, nets are mounted transversely and inhibit the fish entered during the transition of water tides, at one entrance to the dugong seagrass ecosystem. But until now, there is still limited data and information about the condition. Therefore, further research is needed regarding the locations indicated by the existence of dugong.

In order to maintain the sustainability of dugong and its habitat, program of Dugong and Seagrass Conservation Project (DSCP) Indonesia took the initiative to participate in dugong protection efforts in several areas in Indonesia, including Alor Regency, East Nusa Tenggara Province. The effort is done through strengthening the supervision and management aspects of dugong which include the regulatory and institutionalization among the community of local people. Preliminary study about dugong and seagrass in Munaseli Village was done as a part of DSCP program to collect various information related to

population, morphometry, behavior, habitat, ecology, dugong's sounds frequency; also threats and information related to socio-cultural local people.

Informatino and study collected will be the basic protection and management for biota and that habitat. By knowing the information and bio-ecological conditions of dugong very profound, can support the creation of work plan co-management between the people and local government.

Aims

1. Knowing the distribution of dugong animals in the waters of Munaseli Village
2. Assess the association between the presence of dugong with its main feed resources, seagrass
3. Review environmental and antrhropogenic (human-caused) threats to the preservation of dugong and seagrass
4. Identify existence of dugong using bioacoustics in Munaseli Village
5. Knowing the perception of coastal people of Munaseli Village about dugong and seagrass habitat

Outcome

1. There is information from the results of a thorough review of the distribution of dugong and seagrass in Munaseli Village, including : bioecological aspects of dugong and seagrass, environmental and anthropogenic threats, dugong's individual number and frequency of dugong's sound
2. There is information about people's perception about dugong and seagrass
3. There is recommendation regarding the practice of interacting well with dugong and other marine biota in Munaseli Village.

METHOD

a. Time and Places

This activity was held on 24 – 28 October 2017 in coastal area of Munaseli Village, Alor Regency, East Nusa Tenggara.

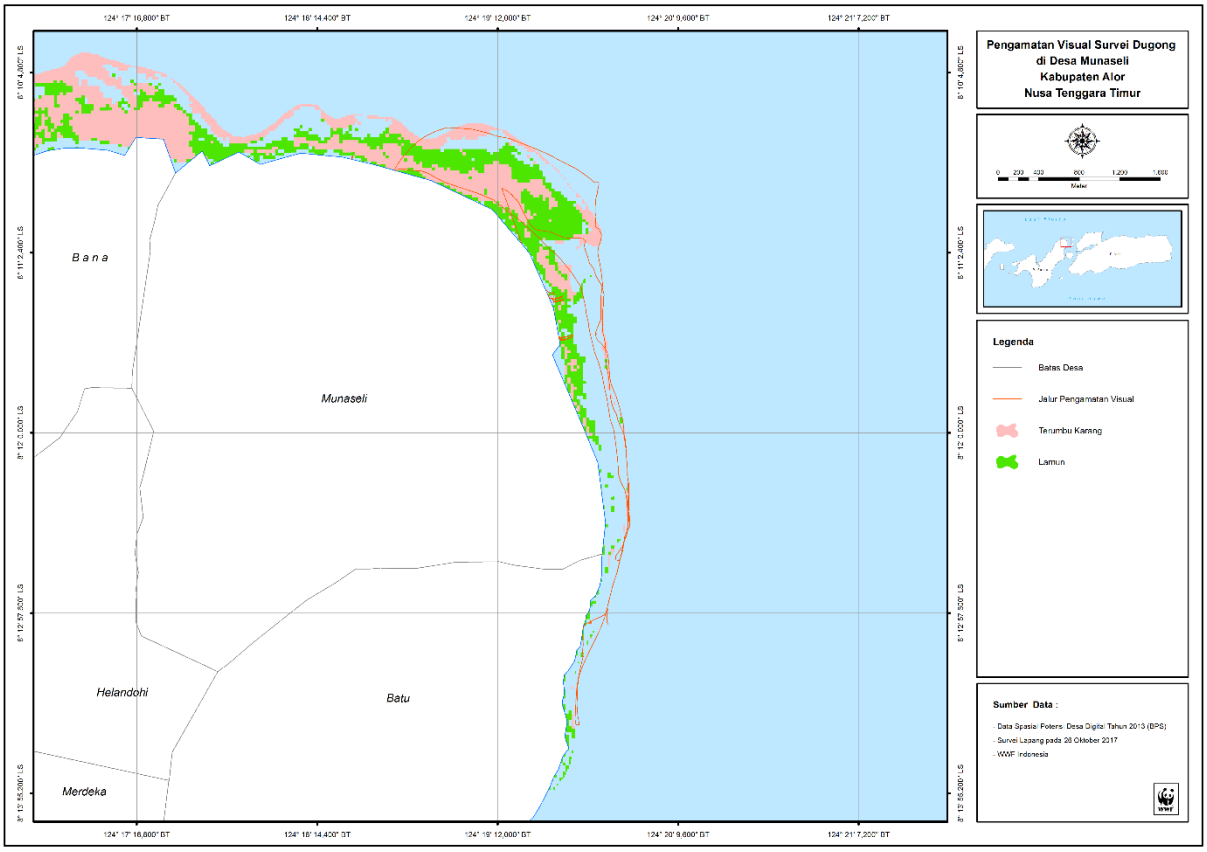


Figure 1 Map of marine mammals visual observation in Munaseli Village, Pantar sub district, Alor Regency, East Nusa Tenggara

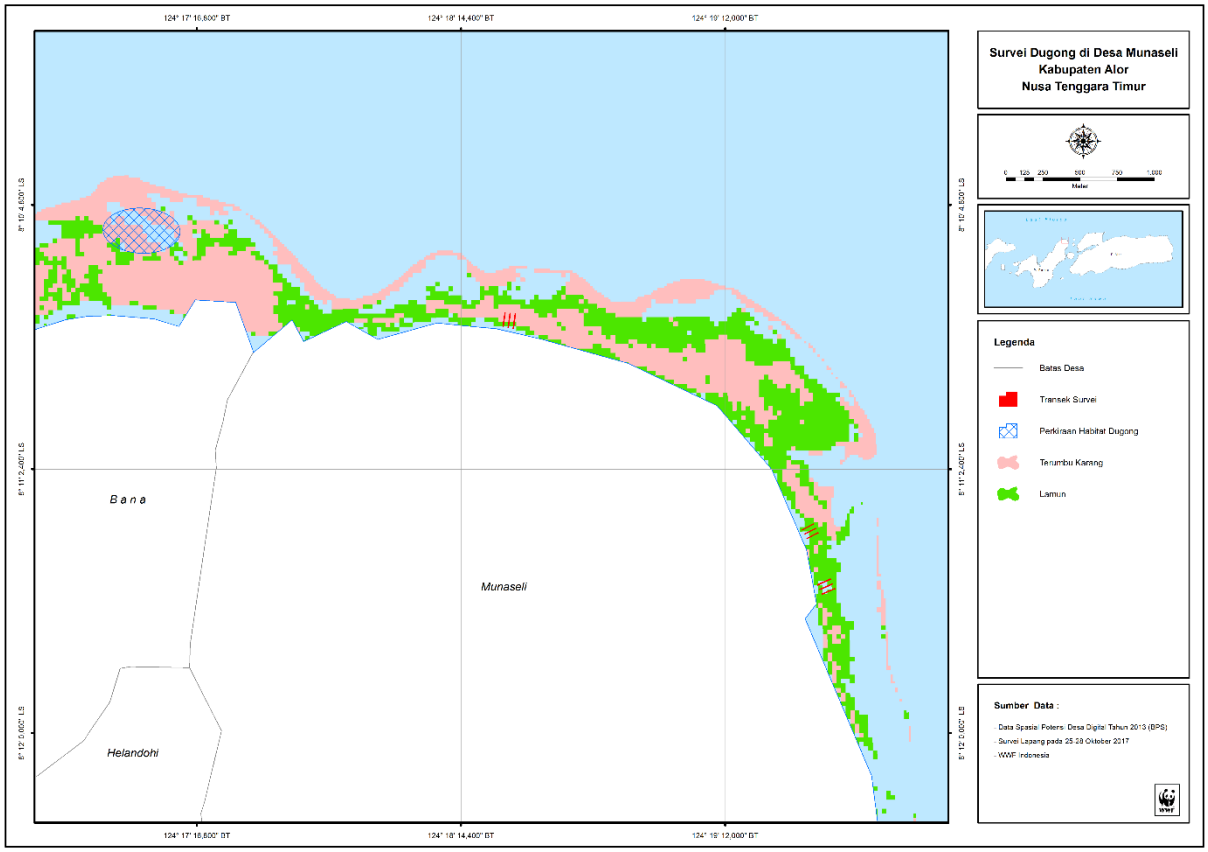


Figure 2 Survey maps of seagrass ecosystem in Munaseli Village, Pantar Sub-district, Alor Regency, NTT

b. Tools and Materials

Tools and materials that needed in this research are as follows :

Table 1 Tools and Materials for Dugong and Seagrass Research in Munaseli Waters

No	Tools	Function
	Dugong Survey	
1	Drone Phantom Dji 3 Pro	Record dugong's emergence
2	Underwater Camera (2)	Research documentation
3	*Global Positioning System* (GPS)	Determined coordinate point and object
4	Small Boat	Manta tow and lead dugong
5	Questionnaire (Akvo flow)	Interview tool
6	Stationary, chest board,	Equipment to monitoring dugong and

	waterproof paper (*Newtop*)	seagrass
7	Binoculars	Observe marine mammals from far
8	*BioAcoustic* recorder	Record dugong's sound
	Seagrass Survey (Dugong's Habitat)	
9	Roll Meter (100 m)	Make transect line
10	Quadreatic transects 1m x 1m	Observation of seagrass density
11	Rope of raffia	Mark the observation area
12	*Handcounter*	Seagrass stand counting tool
13	Seagrass Identification Lifeform	To identify type of seagrass
14	Fin, Snorkel dan Masker	Manta tow and collect sample
15	Scuba Equipment	To underwater monitoring
16	*Water Quality Cheker*	Temperature, salinity, pH and DO measurement
17	Plastic Bag	Sample storage
18	Seagrass Tagging (color clip)	Seagrass marker
19	Bathymetry Map	Bathymetry information

c. Data Collection

At the beginning of the activity, information about dugongs in an area is obtained through literature review (journals, research reports), as well as the collection of anecdotal information sourced from mass media, social media, as well as personal reports and experiences. Then proceed through survey activities.

1. Questionnaire Survey

The participatory survey was conducted by interviewing using questionnaire about the existence of dugong and seagrass, and also people's perception. The questionnaires is summarized in the Booklet guide of National Qustionnaire Survey DSCP-ID3, a development of questionnaire survey about rare animals beruaray jauh (migratory species). Data retrieval was done using AKVOFlow that

contain the data set that has been uploaded into the system. Target respondents are fishermen and local residents who live and do activities in the sea.

2. Aerial Survey

Aerial survey were conducted to record the abundance and distribution of dugong. Aerial surveys can be done using a small plane / drone. Drones are operated at an altitude of +/- 30 meters from sea level at a speed of 6 m/s. at that height the drone can capture images at a distance of 6 meters on the right and left of the line transect. The line trasect used is 400 meters long and the distance between line transects is 100 meters. The description of the aerial survey plan is shown if Figure 2. NM

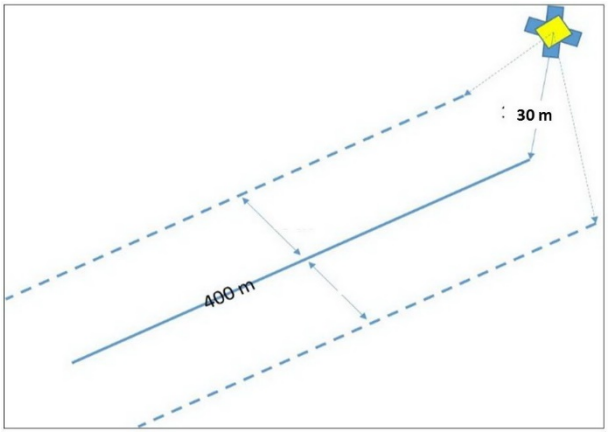


Figure 2 Design of dugong aerial survey by using drone

3. Survey on Boat

Visual survey by boat is conducted by three observers where two observers are in the bow of the ship and one person is at the stern of the ship, this visual observation using binoculars glasses and without equipments (eyes). Observers who were at the bow observed dugong by using binoculars glasses while observer at the stern observed it without any equipment, using eyes only. One of the observers at the bow also act as data recorder. The observation was done in 15 minutes continuously. After 15 minutes, the position of the observer will change position. During the observation, environmental change is one of the factors that must be considered including Beaufort Scale value, wave,

brightness, and tidal. During observation, the data of the trip is stored directly in the GPS.

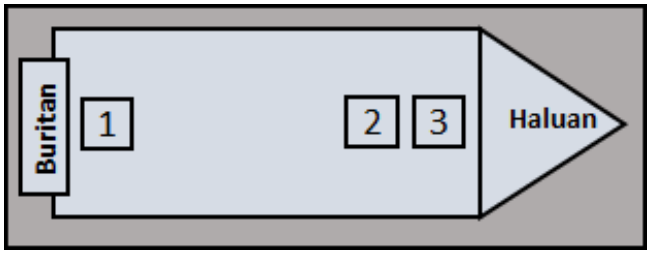


Figure 3 Observer position in survey using boat

4. Feeding Trail Identification

Feeding trail is a path formed by dugong feeding activity. The initial stage of observation is one by doing manta tow with using boat to detect the presence of dugong feeding traces. The feeding traces found are analyzed first, whether they are old or new traces.

The new feeding traces are directly documented using the camera, marked with GPS, recorded in length x width by meter and marked using color clips. This was done to determine the condition of the feeding trace and to avoid double data. As for the old eating trails, performed the same steps, but added the existing high seagrass measurements. This was done to find out how long the trace of eating is there. Observation were made using basic dive equipments (mask, snorkels, fins), GPS, and underwater camera.

5. Collection of Seagrass Data

The data collection of seagrass type distribution, ie by taking the transect line perpendicular to the coastline, start from the first seagrass found up to 100 m towards the cliff. In each transect line the seagrass ecosystem was observed with the help of a 0.5 x 0.5 m^2 transect plot that start at 0 m and repeated every 10 m to 100 m, in each station was done 3 transect lines with a distance of 25 m (Rahmawati, 2014). Data taken on this data collection are : seagrass species, seagrass density, seagrass coverage, and seagrass biomass. Besides biological data, collection of data environmental factor (physics – chemical) also done such as : substrat type, temperature, salinity, pH, DO, and current. The types of

seagreass present in each plot were observed and recorded with reference to Den Hartog (1977), Tomascik *et al*. (1997) and Mckenzie and Yoshida (2009).

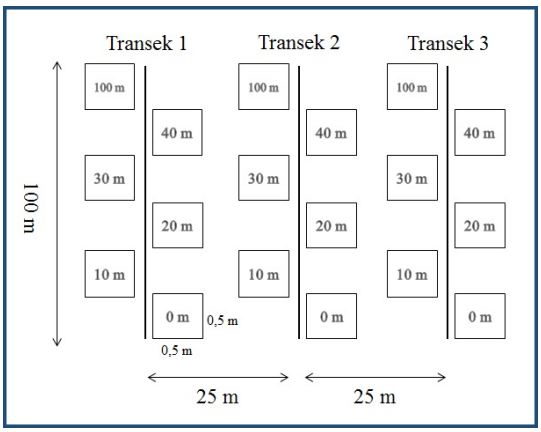


Figure 4 Scheme of seagrass data collection

d. Data Analysis

***Feeding trail* Dugong**

The collected feed trace data is then tabulated using Microsoft Excel and presented the distribution map with ArcGIS software.

Seagrass Density

After obtained the number of each seagrass species in each station, the seagrass density information can be determined by calculating the following equation :

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

Keterangan:

Di : density of species(individuas/m^2)

Ni : Number of individual species i

A : Area of transect quadrant (m^2)

Percentage of Seagrass Coverage

Percentage of seagrass coverage was measure based on visual observation results following Rahmawati's guide (2014).

RESULTS AND DISCUSSION

People's perception about other protected animals

Based on information, 74% of key informants had seen sea turtles. The types of sea turtles that are often seen, such as, lekang sea turtles, sisik, and green sea turtles. People saw the sea turtles when they were on their way to the location of fishing and when they were fishing. People also said that 59% of them also saw dolphins and / or whales. Local name for these animals in Munaseli Village is "kuja" for dolphins, and for whales are "klaru" and "io". People saw dolphins almost every month while they saw whales in October – December every year. In 1980, people claimed there were an incident of stranded whale in Kabir Village, Pantar District.

Seagrass Characteristics in Observation Location

Based on observations of the the distribution of seagrass species in Munaseli Village, Alor Regency, eight species of two familiy seagrass were identified, that are : 1) Family Hydrocharitaceae (*Enhalus acoroides*, *Thalassia hemprichii* dan *Halophila ovalis*). 2) Family Potamogetonaceae (*Cymodocea rotundata, Cymodocea serrulata, Syringodium isoetifolium Halodule uninervis* dan *Thalassodendron ciliatum*) (Table 2).

There are three observation stations of seagrass distribution in Munaseli Village, Alor Regency, that is 1 station (Figure 5) located in North of Munaseli Village, this station is bordered with Bana Village, according to people's information Dugong had seen here.

Figure 5 Station 1 Munaseli Village

Station 2 (Figure 5) is in the middle of Munaseli Village, the station is close to the Munaseli Village Pier. The activity of the ship at the harbor is quite crowded and also the fishermen often see dugong playing in this are. The station is also close to the seaweed cultivation of the Munaseli Village's fishermen. Munaseli Village is one of the regions suitable for seaweed cultivation, especially *Kappaphycus alvarezii* (Cottoni) type.

Figure 6 Station 2 Munaseli Village

Station 3 (Figure 6) is in the south of Munaseli Village, this station is pretty calm and quite, but there are still many ropes of seaweed cultivation. The selection of these three stations is done in order to represent the distribution of species and diversity of seagrass species in Munaseli Village and also based on people's information about the emergence fo dugong in the village.

Figure 7 Station 3 Munaseli Village

Seagrass beds in this Munaseli Village have mixed vegetation, ie where there are seagrass species consisting of 4 to 8 types. Indonesia is a tropical country that has the characteristics of seagrass beds with high species diversity and mixed vegetation

Five of the seven species of seagrass found at the observation site are the seagrass species favored by dugong and also their preference at meals, according to De longh *et al*. (1997) dugong in Lease Islands (Maluku) has a preference for eating seagrasses in order : *Halophila ovalis > Halodule uninervis > Cymodocea rotundata > Cymodocea serrulata > Thalassia hemprichii.*

Table 2 Composition and distribution seagrass types in Munaseli Village

Types	Station 1	Station 2	Station 3
Potamogetonaceae			
Enhalus acoroides	+	+	+
Thalassia hemprichii	+	+	+
Halophila ovalis	+	+	+
Hydrocharitaceae			
Cymodocea rotundata	+	+	+
Cymodocea serrulata	+	-	-
Syringodium isoetifolium	+	+	+
Halodule uninervis	-	+	+
Thalassodendron ciliatum	-	-	+
Total	6	6	7

Throughout the observation transect of *Thalassodendron ciliatum* seagrass(Figure 8) only found in station 3, this species is the type of seagrass that live in shallow water up to a depth of 17 m, but more common found at a depth of 0 – 15 m. This species is found in the coastal area of Munaseli Village, especially in the cliff area and forming a dense, mono-specific seagrass beds.

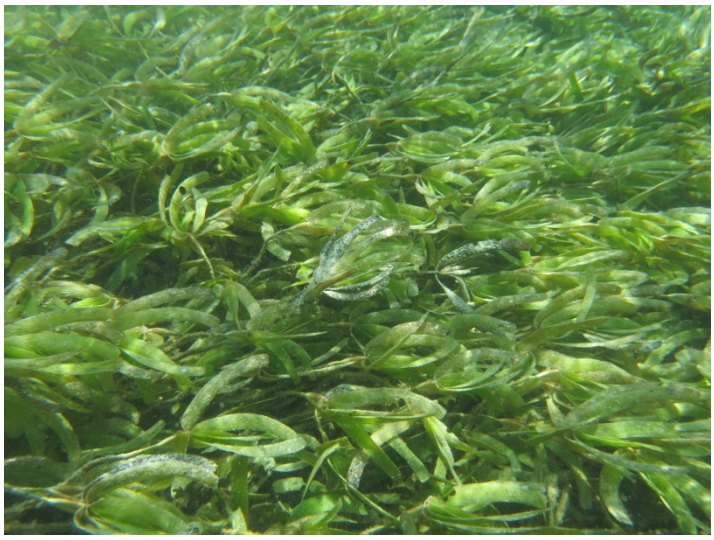


Figure 8 *Thalassodendron ciliatum* in Munaseli Village

Thalassodendron ciliatum has leaves that have red streaks, in the form of collected ribbons forming 1 cluster. One leaf cluster is formed from a long leaf stalk of rhizome. This type of seagrass is woody and has rapid vertical growth but does not colonize. This species is able to live on rocky or sandy substrates, with a strong enough wood trunk, this species is able to protect the coast from coastal erosion.

Seagrass Coverage

The density of seagrass per unit area depends on its type. The types of seagrass with high standing density usually also have high attendance frequency and high coverage.

Table 3 Coverage percentage of seagrass types in observation location

Location	Seagrass Type	Percent Coverage	
		Types	Total
Station 1	*Enhalus acoroides*	6.70 ± 4.51	50.94 ± 18.07 %
	Thalassia hemprichii	24.97 + 11.53	
	Halophila ovalis	4.13 ± 12.38	
	Cymodocea rotundata	9.05 ± 9.70	
	Cymodocea serrulata	2.52 ± 7.57	
	Syringodium isoetifolium	17.19 ± 11.73	
Station 2	*Enhalus acoroides*	22.43 ± 11.41	37.49 ± 18.15 %
	Thalassia hemprichii	32.36 ± 23.83	
	Halophila ovalis	10.26 ± 8.62	
	Cymodocea rotundata	8.00 ± 7.23	
	Syringodium isoetifolium	9.08 ± 0.27	
	Halodule uninervis	9.05 ± 7.54	
Station 3	*Enhalus acoroides*	2.08 ± 2.40	64.31 ± 24.65 %

Location	Seagrass Type	Percent Coverage	
		Types	Total
	Thalassia hemprichii	25.42 ± 19.98	
	Halophila ovalis	10.30 ± 15.83	
	Cymodocea rotundata	23.76 ± 14.04	
	Syringodium isoetifolium	34.22 ± 16.41	
	Halodule uninervis	12.60 ± 8.08	
	Thalassodendron ciliatum	8.89 ± 5.54	

Based on the observation results at the observation location, station 1 and 2 have an average coverage value of 50,94 ± 18,07 % and 37,49 ± 18,15 %, according to LH Ministerial Decree. This value shows that seagrass in both stations are less rich or less healthy (30%-59,5%), while seagrass coverage at station 1 is in rich or healthy condition (<60%) with a mean value of coverage is 64.31 ± 24.65 %.

The seagrass coverage level is highly related to the density and morphology (size) of the constituent seagrass species. Seagrass with high coverage values are generally dominated by species with large morphologies such as *Thalassia hemprichii* in station 1 and 2. One *Thalassia hemprichii* individual will have higher coverage value compared to one *Halodule uninervis* individual, because the size of *Thalassia hemprichii*'s leaf is much bigger. While smaller size seagrass individual such as *Halophila ovalis* will have a smaller percent coverage as well. In contrat to the type of *Syringodium isoetifolium* has the highest average value at station 3, this type of seagrass is almost always found and has a high density value in each transect.

Figure 9 Seagrass coverage of *Enhalus acoroides* and *Thalassia hemprichii*

It does not mean an area with less rich and less healthy seagrass coverage is categorized as bad / awful area, especially to be a feeding area of dugong, an area with less healthy coverage but has the type of seagrass and suitable substrate conditions, will make dugong keep coming to the area to eat or play. Dugong likes to eat in areas that have fine sand substrate ad small seagrass species such as *Halodule uninervis, Halophila ovalis* and *Cymodoce rotundata* types of seagrass.

Seagrass Density

The density of the seagrass per unit area is very dependent on the type of seagrass in each location. The types of seagrass with high standing densities usually also have high frequency attendance and high coverage.

Based on the observation, the highest seagrass density is on the type of *Halodule uninervis* with the number of stands 179-466 stands/m^2 (Figure 10). *Halodule uninervis* is the type of seagreass that is a pioneer and able to live in conditions that are not good or in interference and have a fast growth, this type of seagrass is not large but small and long.

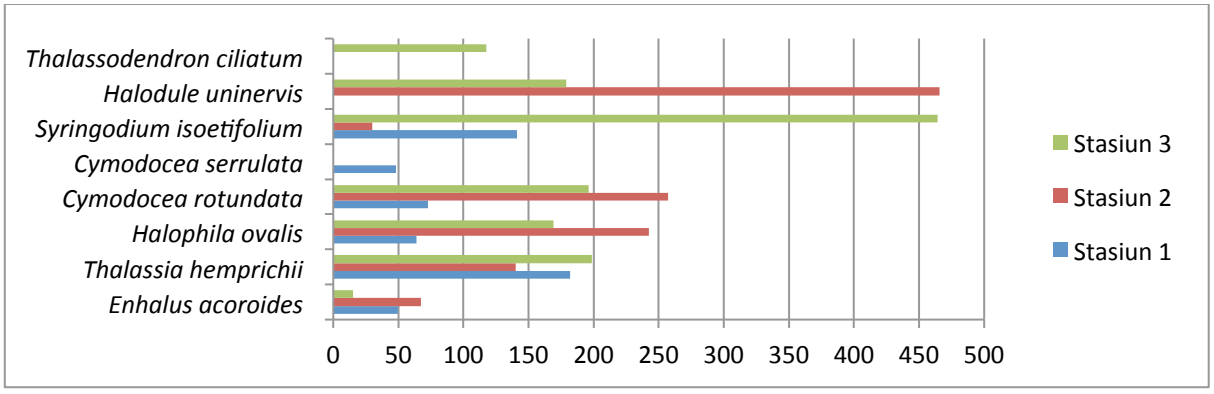


Figure 10 Density of seagrass types Munaseli Village

The next highest seagrass density is by the type of *Syringodium isoetifolium* (Figure 10) with amount of stands is 30-464 stands/m^2. *Syringodium isoetifolium* is the type of seagrass that able to adapt in waters up to 15 m and has a cylindrical body like a stick. Zieman (1986) states that the density of seagrass in an area is affected by its abiotic conditions such as water clearness, circulation, water depth, substrate, and nutrient content.

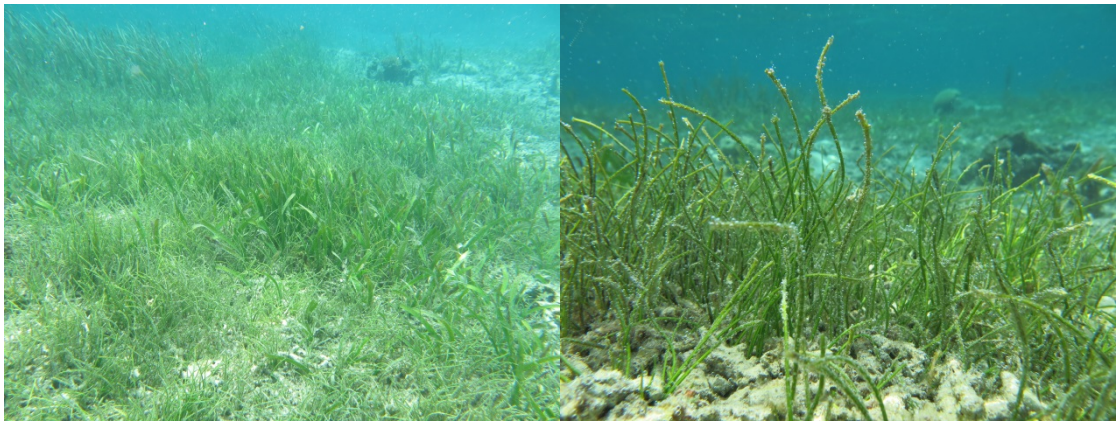


Figure 11 Seagrass Syringodium isoetifolium type

Feeding Trail Identification

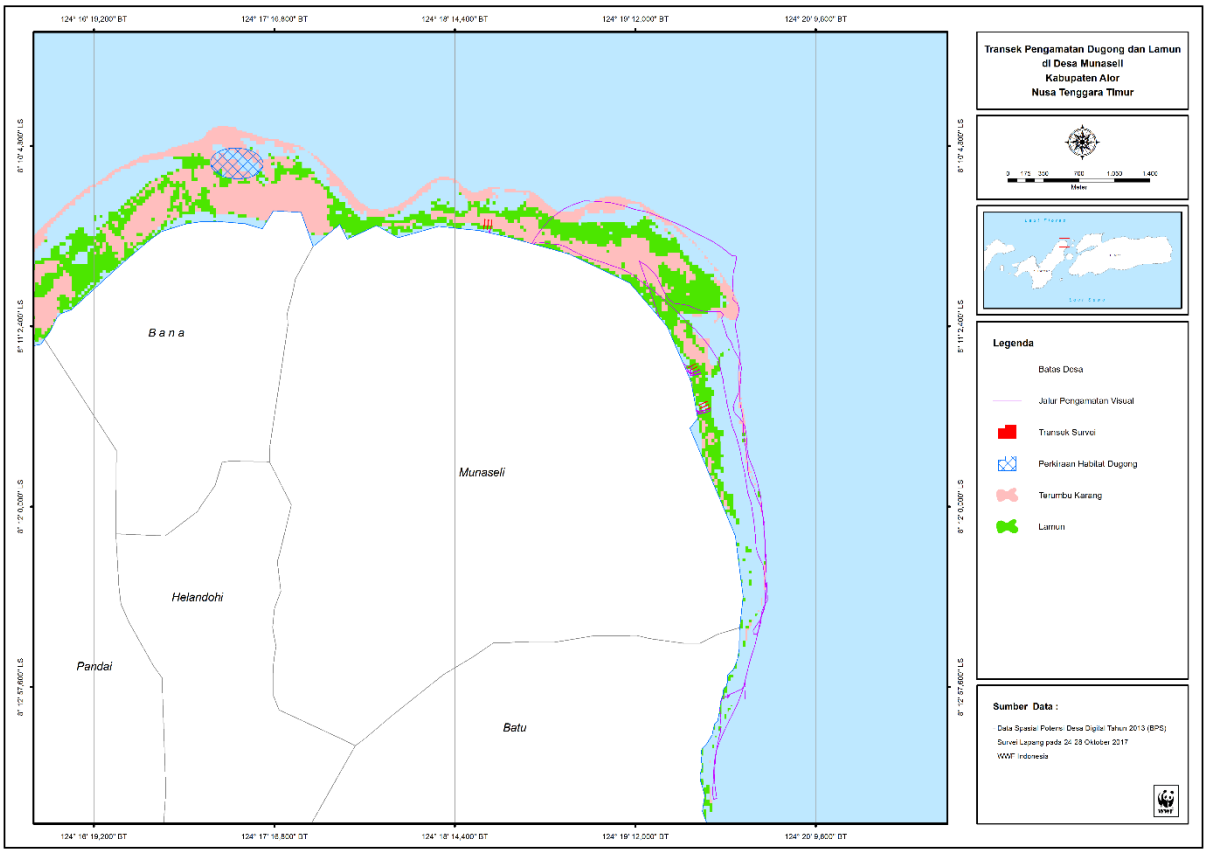


Figure 12 Map of dugong's feed trail identification in Munaseli Village and surrounding area

Based on the feeding trail identificatoin that was done, indication of the feeding trace (Figure 12) is only found in the north of Munaseli Village almost adjacent to the Bana Village. The traces of the food found were not new eating traces in Grazing or eat by dugong, but the feeding traces dugongs had left behind long ago. This is because the food

trail has been overgrown by pioneer seagreass species such as *Halophila ovalis* and has already not formed a newly eaten feeding pattern.

Dugong has a different way of eating depending on the morphology of seagrass and substrate. When dugong feeds on small morphological seagreass species (*Cymodocea*, *Halophila*, *Halodule* and *Syringodium*) and has a substrate of fine sand, the dugong will gouge all parts of the seagrass, from the roots of the stem and its leaf, or known as Grazing. The dugong feeding trail in this way will leave a trail of 10 – 25 cm (about the width of the dugong's face) and has a length ranging from 30 cm – 6 meters.

When dugong feeds on the larger morphological seagrass (*Enhalus* dan *Thalassia*) and has a substrate that coarse and dense, dugong will cut seagrass leaf and leave no trace of it, only the remaining seagrass, this way of feedign is known as Cropping.

Figure 13 Dugong feeding trail in Munaseli Village

The dugong feeding trace shown in Figure 13 is found at a depth of 6 m waters in low tide conditions and has fine sand substrate. The type of seagrass that were many found is the type of *Halophila ovalis*. Dugong is very fond of this type of seagrass, because this type of seagrass has a small size so that the dugong is very easy to pry and eat it, but this type of seagrass also has a high N content and low fiber, and the underground part (as a rhizoma or rhizomes and roots) contain lots of carbohydrates and high energy.

Aerial Survey

The air survey was conducted at points that indicated of existence of dugong and at points that have not yes indicated of dugong. Points that indicated of dugong are the border of the Munaseli Village and Bana Village, and then in front of the Munaseli Port (Pond), and

south of Munaseli Village. Air surveys are conducted following a visual transect (Figure 1) where location points are shown in Figure 14.

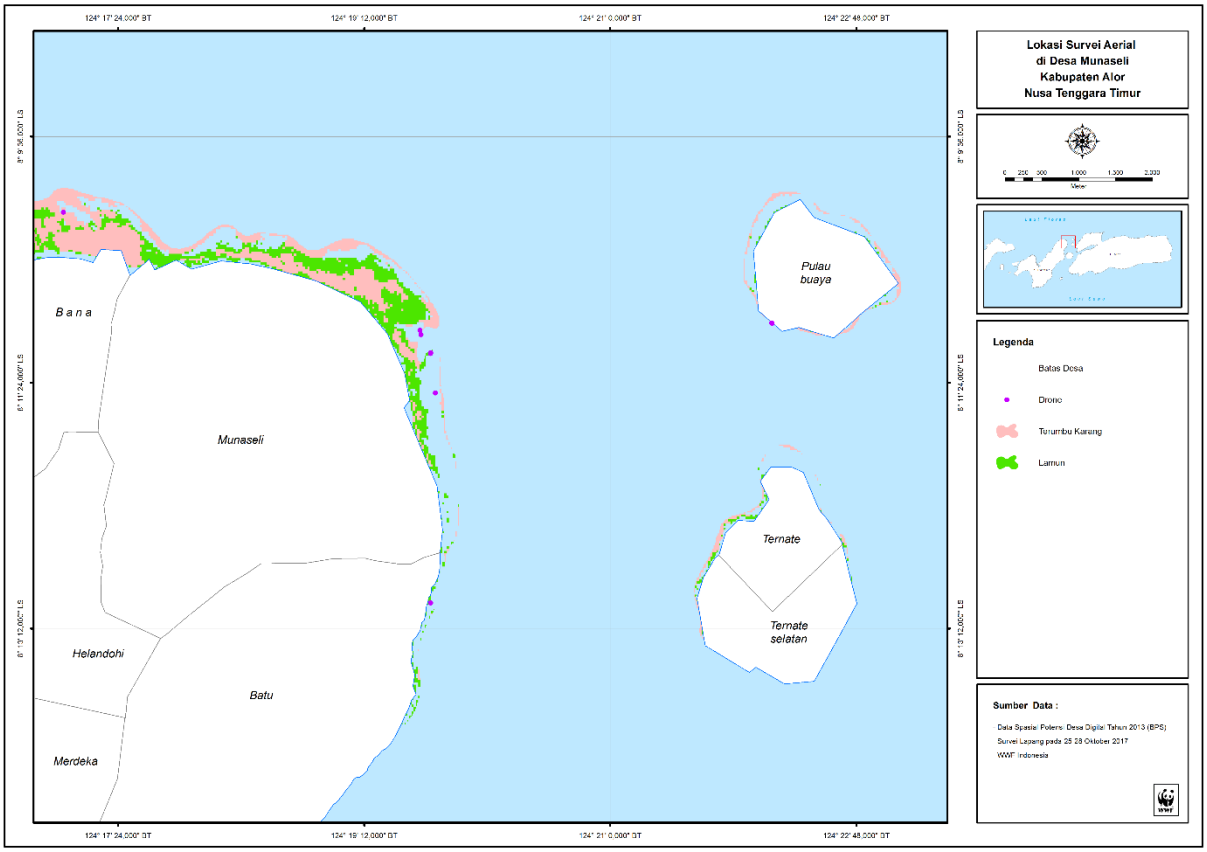


Figure 14 Air transect map in di Munaseli Village

Based on aerial survey, there were no emergence nor appearances of dugongs. Common locations or places that fishermen or people saw dugong, at the time of observation is not seen at all. The Munaseli Village fishermen often see the dugong on the north side of the port, precisely in the pond near the lighthouse (Figure 14). The pool is like a large hole buried with a deep depth and has a base of sand substrate. The pool is often visited by dugong to move or play.

Figure 15. Pond where dugong do activities

The activity of the boats in the area of this pond is quite crowded, because this area is the in and out path of the boats that goes to Munaseli Village's port. Dugong is a marine mammals that sensitive to disturbance, according to Anderson (1982) dugong will go far away 150 – 500 m if there is a disruption of passing ship, Preen (1992) added dugong able to detect + 1 km if there is an approaching ship. Therefore, the presence of dugong in this area is still quite wild and very sensitive to ship activity. So if the area is often visited by dugong, the observation at this location should be quiet and take a long time.

In the observation of air, two other marine animals are observed in the Munaseli waters area, that are green sea turtle (*Chelonia mydas*) and eagle stingray (*Aetobatus* Sp.) (Figure 16). These animals were found strolling aroud in coastal waters where in the area also dugong often found by fishermen.

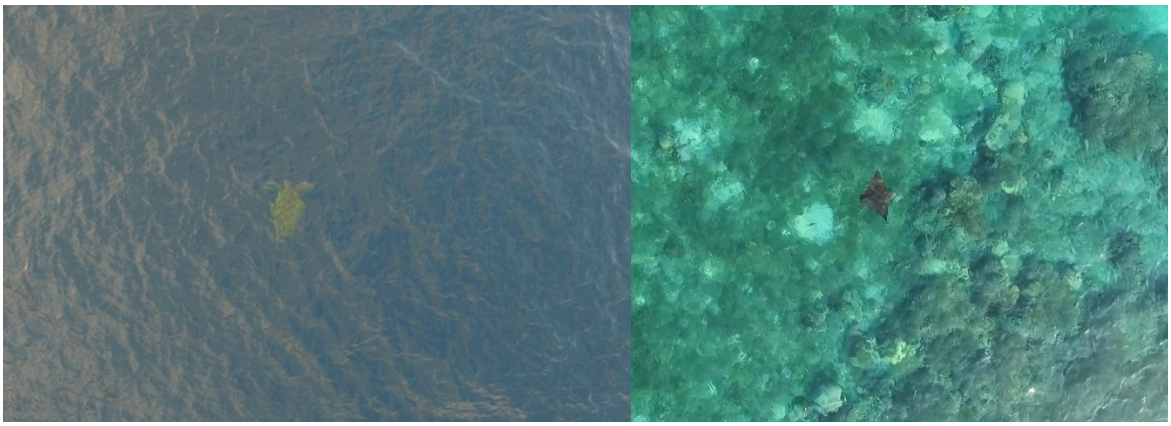


Figure 16 Green sea turtles (Chelonia mydas) and eagle stingray (Aetobatus Sp.)

Boat Survey

This survey using boat is done along the coastal waters of Munaseli Village, the time of the survey was conducted at the time of sea water is rising, in hope to see or meet duguong who are active in the coastal area. Based on observation by boat, there is not a single dugong individual rising water surface. Dugong is a very shy and sensitive animal to the surrounding threats. When observing by boats, observers must be very careful to see its appearance on the surface of the water. Dugong will rise to the surface of the water to take a breath in 1 – 2 seconds and very rarely show its back.

At the time of observation, it was found several groups of dolphins / spotted dolphins (*Stenella attenuata*) (Figure 17) that are doing activities. The dolphins are doing a feeding activity, those dolphins found not far from the are where dugong are often to be found.

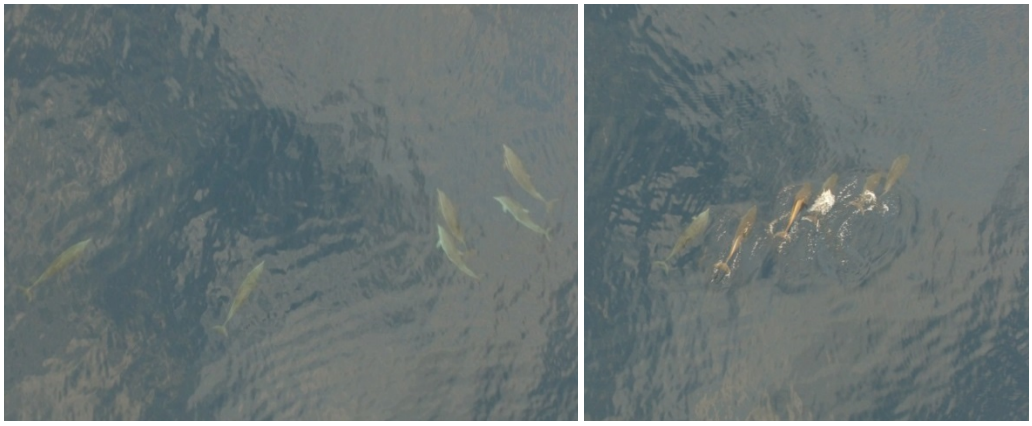


Figure 17 Spotted dolphins (Stenella attenuata) in waters of Munaseli Village

Environmental and Anthropogenic Threats Against Sustainability of Dugong and Seagrass

In general, the coastal area of Munaseli Village is still well preserved, the condition of the waters that is clean and has a quite preserved seagrass ecosystem and coral reefs. Munaseli Village has 8 types of seagrass out of 13 seagrass types that are in Indonesia. This is a sign that the water is fertile and preserved. The average temperature is in the range of 30,4^{0}C – 34,8^{0}C. This condition is still included as normal catefory. According to Dahuri (2003), optimum temperature required for seagreass growth is around 28^{0}C – 30^{0}C. For seagreass, temperature could affect physiological processes such as photosynthesis, respiration rate, growth, and reproduction. If it is outside the optimum range then the

physiological processes can decrease sharply. Bulthuis (1987) added that the temperature of 25-35^{0}C, is the optimum temperature for photosynthesis in seagrass.

The pH value obtained from the six stations ranged from 8.2 to 8.3. This conditoin is still classified as normal, according to Minister of Environment Decree No 51 of 2004, pH threshold value at sea waters is 7 – 8,5 $\pm$ 0,2. This also explained by Phillips dan Menez (1988) that seagreass could grow well when pH of normal sea water, that is ranged between 7.8 and 8.5 because at that time the bicarbonate ions required for photosynthesis by seagrass are in abundance. The pH value is very important to know in a water because pH will be the type and rate of reaction controller some materials in water.

Seagrass is an angiospermae plant that lives in coastal of salt waters or sea waters. In Munaseli Village, seagrass almost grows throughout the coastal waters. Besides to overgrown by seagrass, the coastal waters of Munaseli Village is also utilized by the people to cultivate seaweed (Figure 18). The scale of cultivation is not on small scale, but large scale. Fishermen install transect ropes for the cultivation in some seagrass areas, the types of seagreass that overlap with the seaweed cultivation area, is food to dugong. Therefore, one of the threats to the preservation of dugong and seagrass in Munaseli Village is the cultivation of seaweed that is increasing widespread and overlap with the seagrass that become dugong food, this can cause dugong will disappear and will not come to the village, because the food obstructed by the ropes of seaweed cultivation. Steps that need to be done are socialization with people and fishermen, to restrict or direct allowed areas to cultivate and for seagrass protection areas.

Figure 18 Seaweed cultivation in Munaseli Village

Besides seaweed cultivation, other threats are the activities of boats and activities of fishermen, these activities can threaten the preservation of dugong and seagrass. Because according to fishermen information, dugong often play or move near the lighthouse not far from the port, if the ships are not careful, incident such as dugong hit by the ship could happen. Therefore, ships that will go to the Munaseli Port, incident such as dugong hit by the ship could happen. Therefore, ships that will go to the Munaseli Port, should be encouraged to lower the speed and be careful with the presence of dugong. The ships also need to be told not to carelessly dispose oil or garbage in the coastal area of Munaseli Village, because it will pollute the waters.

The presence of fishermen near the lighthouse (pond) where dugong do activities is also a threat to the dugong preservation, because when regular boats are operating, fishermen put trawlers / Gill net to catch fish and sharks. However, besides fish and sharks in the last 2 years, it have caught dugong and entangled by net 2 times. Therefore, the placement of nets needed to be regulated, so that all utilization activities around the waters of Munaseli Village could run alongside.

CONCLUSION

Based on the results of research it can be concluded that :

1. There are 8 types of seagrass in Munaseli Village, that are : *Enhalus acoroides*, *Thalassia hemprichii, Halophila ovalis*, *Cymodocea rotundata, Cymodocea serrulata, Syringodium isoetifolium Halodule uninervis* dan *Thalassodendron ciliatum*.
2. No dugong were found during the survey. The dugong feeding trail is found only on the border between Munaseli Village and Bana Village, in an area covered by type of seagrass *Halophila ovalis* species.
3. There is boats activity, seaweed cultivation in seagrass beds area, and fishermen activities set up trawl in pond area that can threatened dugong and seagrass conservation in Munaseli Village.

REFERENCE

Anderson PK. 1982. Studies of dugongs at Shark Bay, Western Australia.II. Surface and subsurface observations. *Aust. Widl. Res*. 9:85-99.

Dahuri R. 2003. *Keanekaragaman Hayati Laut Aset Pembangunan berkelanjutan Indonesia*. Jakarta: PT Gramedia Pustaka Utama.

De Iongh HH, Bierhuizen, Van Orden. 1997. Observations on the behavior of the dugong *Dugong dugon* (Müller, 1776) from waters of the Lease Islands, Eastern Indonesia, *Contrib. Zool.* 67(1), 71-77.

Den Hartog. 1977. *The Seagrass of the word. North Holland Publ*. Co. Amsterdam. 112p

McKenzie LJ, Yoshida RL. 2009. Seagrass-Watch: Proceedings of a Workshop for Monitoring Seagrass Habitats in Cape York Peninsula, Queensland, 9-10 March 2009. (Seagrass-Watch HQ, Cair.ns). 54pp.

Phillips CR, Menez EG. 1988. *Seagrass*. Washington D.C.: Smithsonian. Institutions Press.

Preen AR. Thompson J. and Corkeron PJ. 1992. *Wildlife and management: dugongs, waders and dolphins*. In 'Moreton Bay in the Balance'. (Ed. O. N. Crimp.) pp. 61–70. Australian Littoral Society & Australian Marine Science Consortium: Brisbane).

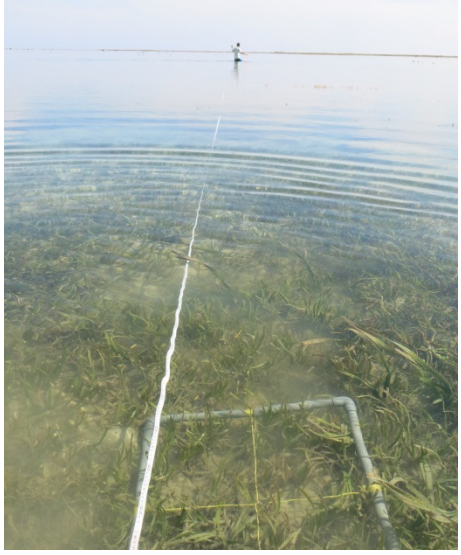
Rahmawati S, Irawan A, Supriyadi IH, Azkab MH. 2014. Panduan Monitoring Padang Lamun. Jakarta. COREMAP CTI LIPI

Tomascik T, Mah AJ, Nontji A, Moosa MK. 1997. *The ecology of Indonesian seas. Part two*. The Ecology of Indonesia Series, 752p.

Zieman JC. 1986. Gradients in Carribean seagrass ecosystem. Jamaica: *Unesco reports in Marine Science*: 25-29.

APPENDICES

Appendix Transect line of seagrass

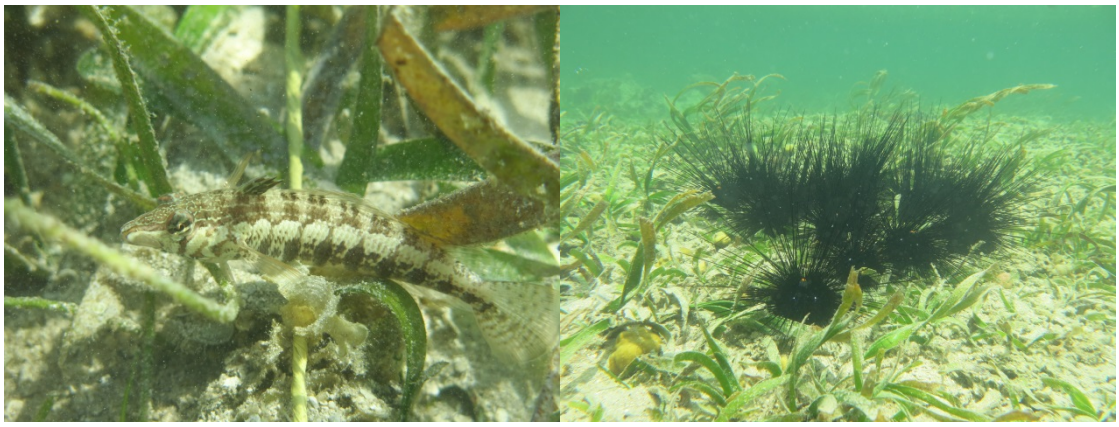


Appendix 1 Counting the amount of seagrass stands

Appendix 2 Seagrass coverage

Appendix 3 Seagrass association animals

Horned Starfish (*Protoreaster nodosus)*; Sea urchin (*Tripneustes gratilla*)



Fish Family Gobiidae; Sea urchins (*Diadema setosum)*

Sea anemone; sea urchin

Macro algae *Halimeda sp.*; Sea anemone