DUGONG AND SEAGRASS HABITAT

Sangihe, 25 JulY – 6 August 2016

© WWF-Indonesia/Juraij

Preface

Grateful thank to The Almighty God for every blessing given to authors in completing survey report entitled “Dugong and Seagrass Habitat in Sangihe”. The authors also would like to express sincere gratitude to those who have contributed either material supports or their valued thought.

The authors hope that this report may be useful and beneficial especially for the dugong and seagrass conservation in Indonesia.

Regardless of those, the authors are fully aware that this report might still have flaw either in the use of sentence or grammar. Hence, the authors are open to any suggestion and critic in order to excel this report.

Jakarta, August 2016

Authors

CONTENTS

SUMMARY

Dugong (*Dugong dugon*) or commonly known as Duyung (in Bahasa) is one of thirty-five marine mammals' species which is found distributed in Indonesian waters, especially in a seagrass bed habitat. Despite of its body weight which reaches 600 kg, this marine mammal species has a sociable behavior and live closely associated with seagrass habitat as its feeding ground.

Dugong has a complicated life threats. Biologically, dugong has a low reproduction rate which at least needs 10 years for the species to be mature. Once it becomes mature, a female dugong goes through 14 months of pregnancy before giving birth to one offspring within 2.5-5 years of interval. Another possible threats are accidental catch by fishing gears (bycatch), massive hunt for meat consumption, tusk, and "tears" which are claimed to be economically valuable.

Dugong dugon or Dulung (native Sangihe language) is not a bizarre animal to indigenous community of Sangihe Islands, as most of them have been aware of this sizeable marine species existence surround their living. This marine mammal is widely distributed in Sangihe waters, scattered from north Sangihe, south Sangihe, west Sangihe, to east Sangihe.

According to the information which is received from local fishermen, Dugong is frequently found in Batuwingkung Village, Beeng land and waters, Binebas, Siunge, Lesabe, Manganitu, Tidore, ikuang, Nusa Tabukan Nanusa, Bukide, Peta and Embuhanga (Figure 4.)

The fishermen community's awareness of the importance of conservation efforts on protected species appears to be low. This can be seen from the ongoing practice of hunting protected species such as shark. Hunt on dugong, on the other side seems to be no longer reported. The species was massively hunted and exploited back in the 90's to 2000. One village which was known for having greatest hunter of Dugong is Simueng village. However, the hunter is disable to continue his hunting activity as he suffers from brain stroke.

Based on the identification in the observation site, there are five species of seagrass found inhabiting Dugong's feeding ground. The five seagrass species are *Thalassia hemprichii*, *Halophila ovalis*, *Cymodocea rotundata*, *Halodule uninervis* and *Syringodium isoetifolium*. In addition, during visual observation, there are three dugong found; two dugongs were in feeding ground and the other dugong was found wandering around. Dugong that inhabit the waters surround this village appears to live conveniently with no significant threats except the minor distraction caused from the tourist who come to see the species in their natural habitat.

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

Background

Dugong (*Dugong dugon*) or commonly known as Duyung (in Bahasa) is one of thirty-five marine mammals' species which is found distributed in Indonesian waters, especially in a seagrass meadow habitat. Despite of its body weight which reaches 600 kg, this marine mammal species has a sociable behavior and live closely associated with seagrass habitat as its feeding ground.

Dugong has a complicated life threats. Biologically, dugong has a low reproduction rate which at least needs 10 years for the species to be mature. Once it becomes mature, a female dugong goes through 14 months of pregnancy before giving birth to one offspring within 2.5-5 years of interval. Another possible threats are accidental catch by fishing gears (bycatch), massive hunt for meat consumption, tusk, and "tears" which are claimed to be economically valuable.

Stranding phenomenon of Dugong also sometimes tends to cause tragic death, and this affects the population of Dugong in the natural habitat. Furthermore, habitat degradation and pollution are argued causing massive destruction of seagrass meadow as Dugong foraging ground. Because of these reasons, the population of Dugong is significantly threatened and an even more vigorous protection effort is needed to overcome this matter.

Dugong is protected under National Act No. 5 of 1990 (UU No.5 Tahun 1990) about Natural Resources and Ecosystem Conservation and National Act No. 31 of 2004 (UU No. 31 Tahun 2004) about Fisheries. In addition, Dugong is also protected by international law and listed under 'Global Red List of IUCN' as '*Vulnerable to extinction'*. *Dugong is also included in Appendix I of the* Convention *on International Trade in Endangered Species of Wild Fauna and Flora (CITES) which signifies that all body parts of Dugong should not be traded in any forms.*

Despite of being protected under both national and international law, the conservation process of Dugong seems to have not been optimal. Insufficient data and information about either Dugong population or its habitat leads to limitation in conservation efforts that related to Dugong and seagrass in Indonesia.

Information on Dugong presence in Sangihe has been known. It is not only found alive, but Dugongs are also commonly found in dead condition. Further research related to the presence of Dugong and its seagrass habitat Dugong has never been done. Therefore, we need

more research related to the locations which indicate the presence of Dugong, including in the village of Likuang, North Tabukan, Sangihe Islands and surrounding.

Aims

1 Knowing the distribution and Dugong population in the village Likuang, North Tabukan, Sangihe Islands and its surroundings.

2 Assessing the association between the presence of Dugong with the main feed resource, namely seagrass, in the village of Likuang, North Tabukan, Sangihe Islands and its surroundings.

3 Examine the threat both environmental and anthropogenic against conservation of Dugong and seagrass, which became a key habitat and feed resources.

METHOD

a. Time and Place

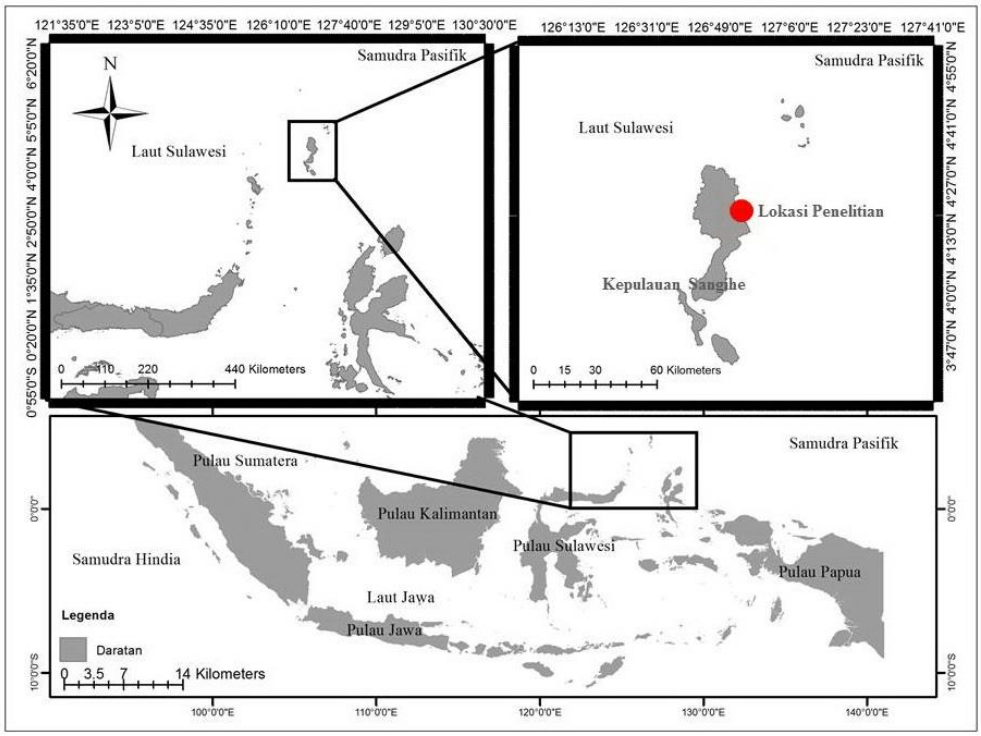


Figure 1. Study Site Map

This activity was conducted from 23th July to 1st August 2016, Regency of Sangihe, North Sulawesi.

b. Details of the Survey

Monday - Saturday July 25 to 30, 2016 the team conducted a questionnaire survey in Tidore, Binebas, Beeng (mainland and waters), and Batuwingkung.

Sunday, Juli 31 2016 : The team gathered in the village of Likuang, District of North Tabukan

Monday August 1 2016 : The team started a visual survey by using drones, binocular and Scuba.

Tuesday August 2 2016 : The team started a visual survey by using drones, binocular and Scuba, and observed foraging habitat (seagrass).

Wednesday August 3 2016: The team started a visual survey by using drones, binocular and Scuba, and observed foraging habitat (seagrass).

Thursday August 4 2016 : The team started a visual survey by using drones, binocular and Scuba, and observed foraging habitat (seagrass).

Friday August 5 2016 : The team started a visual survey by using drones, binocular and Scuba.

Saturday August 6 2016 : The team went back to Jakarta

c. Data Collection

At the beginning of the activity, information about the Dugong in a region obtained through the study of literature (journals, research reports) as well as the collection of anecdotal information from the mass media, social media, as well as personal statements. Then it was proceeded through the survey activities

Questionnaire Survey

Participatory surveys conducted by interview using a questionnaire about the existence of Dugong adopted in Bahasa Indonesia. Target responder is government employees, residents and fishermen in the vicinity of the study, the necessary tools in this activity is the questionnaire (attached) and stationery.

Aerial Survey

Aerial survey is done to collect the data of Dugong abundance and ditribution. Aerial survey can be done by using small plane or by using drone. In this study, drone was used, and was flown at 30 and 60 m above the sea level with 3 m/s speed. The

transect line which was used during the observation was the 400 meter ones with 10 transect lines. The area that could be monitored by the drone in one transect line was 20 ha for 30 m heights and 40 ha for 60 heights. Illustration of aerial survey transect line is shown in Figure 2.

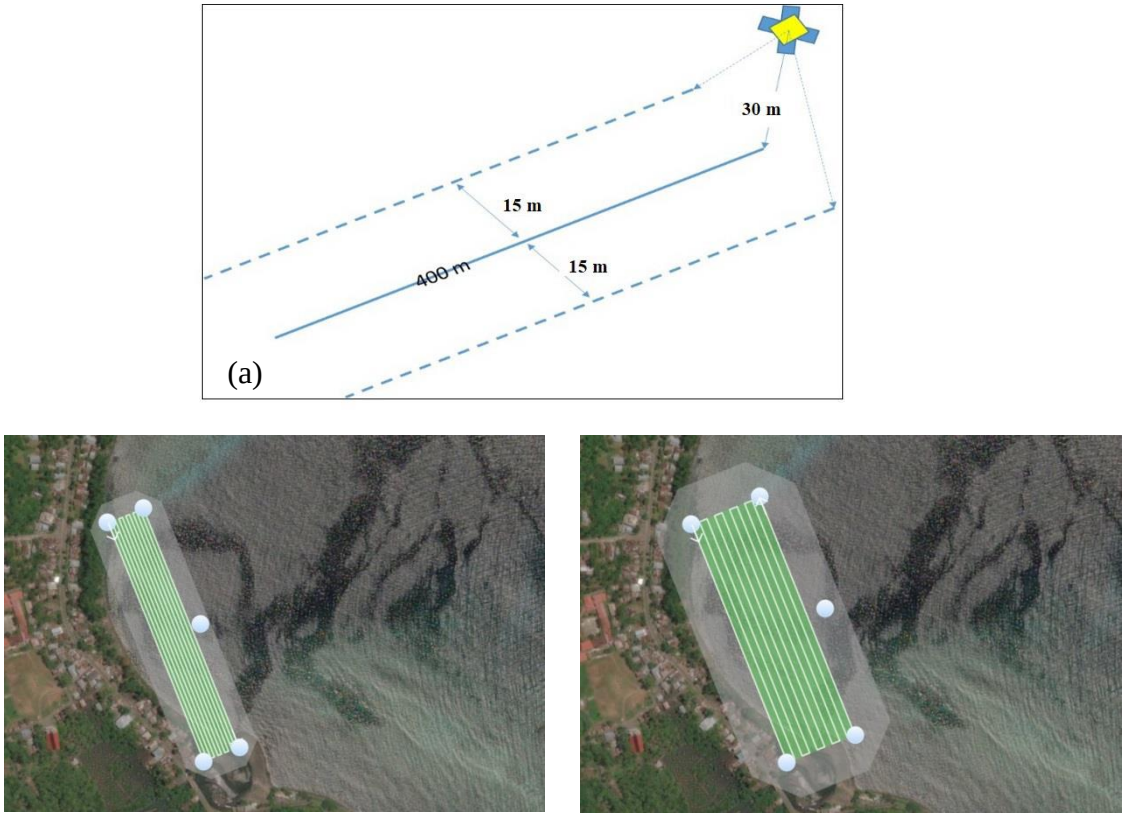


Figure 2. (a) Aerial survey design of Dugong by using drone
(b). At 30m heights and (c) At 60m heights.

Identification of Dugong Feeding Trail

Feeding trail is a typical trail/ track which is formed as a result of feeding activity of Dugong. In early stage of observation, manta taw activity was done onboard to detect the feeding trail of Dugong. Once the feeding trail is found, it has to be analyzed whether it is a recent or old trail. A recent feeding trail has to be documented by using camera, marked its location by using GPS, recorded its length and width by using measuring tape and marked once it is recorded by using colored paper clip. This was done to know the condition of feeding trail and to avoid repetitive data recording. On the other hand, the old feeding trail was treated similarly plus has an extra measurement on the height of the seagrass in order to estimate the how long has feeding trail been presented. Observation on feeding trail was done by using basic diving gear (mask, snorkel, fins, GPS, and camera).

Observation on Dugong Behavior

Observation on Dugong's behavior was done to understand the activity of the species in the waters. The observation was done by using *adlibitum* method: record every activity and its period from the observed Dugong. This observation required SCUBA diving gears, camera, and writing materials. This method is advantageous to record rare and unusual event, but has significant implication in explaining such event descriptively. Moreover, the method eases the observer to describe ongoing event specifically.

Dugong Foraging Habitat

Data of seagrass species distribution was collected by using transect linear method; a method which is based on a perpendicular transect line which is made on shore line starting from the first seagrass observed to 100 metres towards abbys. On every transect line, observation on seagrass ecosystem was done by using transect plot measured by 0.5 x 0.5m^2, and it was started from 0 m and repeated in every 10 m until it reached 100m. In each station, three transect line was drawn with 25m distance from each other (Rahmawati, 2014). The data collected in this process was: species identification of seagrass, seagrass density, seagrass cover, and seagrass biomass. Besides biological data, environmental factors (physical-chemistry) such as type of substrate, temperature, salinity, pH, Dissolved Oxygen (DO), and current was also recorded. All species of seagrass were observed and recorded by referring to the guidelines by Den Hartog (1977), Tomascik *et al*. (1997) and Mckenzie and Yoshida (2009).

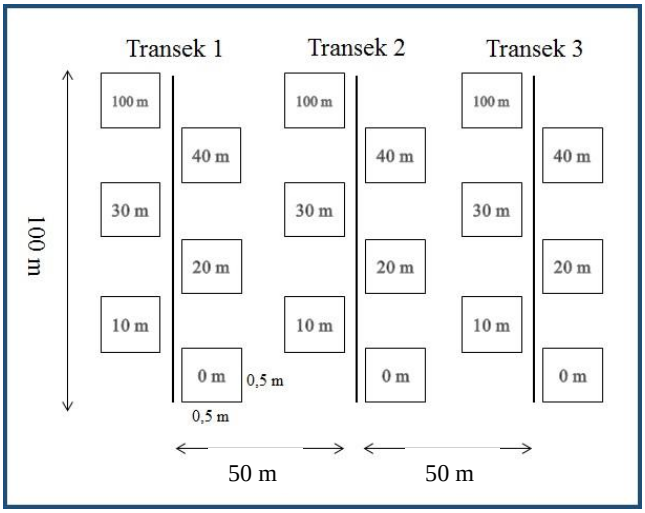


Figure 3. Scheme of Seagrass Data Collection

Biomass

The data of seagrass biomass in every plot was collected by using a 25 x 25 cm for four times. A number of seagrass sample were taken as a whole plant (root, rhizome, and leaves) and put into a plastic bag which is filled with 5% formalin. The samples were labeled and brought to the laboratorium.

RESULT AND DISCUSSION

Questionnaire Survey

Dugong dugon or Dulung (native Sangihe language) is not a bizarre animal to indigenous community of Sangihe Islands, as most of them have been aware of this sizeable marine species existence surround their living. This marine mammal is widely distributed in Sangihe waters, scattered from north Sangihe, south Sangihe, west Sangihe, to east Sangihe.

According to the information which is received from local fishermen, Dugong is frequently found in Batuwingkung Village, Beeng land and waters, Binebas, Siunge, Lesabe, Manganitu, Tidore, ikuang, Nusa Tabukan Nanusa, Bukide, Peta and Embuhanga (Figure 4.)

The fishermen community's awareness of the importance of conservation efforts on protected species appears to be low. This can be seen from the ongoing practice of hunting protected species such as shark. Hunt on dugong, on the other side seems to be no longer reported. The species was massively hunted and exploited back in the 90's to 2000. One village which was known for having greatest hunter of Dugong is Simueng village. However, the hunter is disable to continue his hunting activity as he suffers from brain stroke.

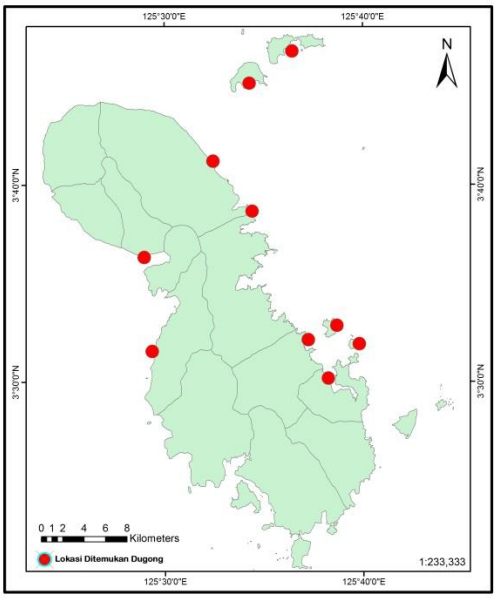


Figure 4. Distribution Map of *Dugong dugon* in Sangihe Island

Characteristic of Seagrass in Study Site

Based on the observation of seagrass distribution in Likuang Village, North Tabukan Utara, there were five species identified from two major family, i.e: 1) Family Hydrocharitaceae (*Thalassia hemprichii* and *Halophila ovalis*). 2) Family Potamogetonaceae (*Cymodocea rotundata*, *Halodule uninervis* and *Syringodium isoetifolium*) (Tabel 1).

Table 1 Seagrass species varieties in foraging habitat of Dugong

Family / Species	Station		
	1	2	3
A. Hydrocharitaceae			
1. *Thalassia hemprichii*	+		+
2. *Halophila ovalis*	+	+	
B. Potamogetonaceae			
3. *Cymodocea rotundata*	+	+	+
4. *Halodule uninervis*	+	+	+
5. *Syringodium isoetifolium*	+	+	+

Figure 5 Seagrass Species Varieties in Dugong Foraging Habitat

Seagrass meadow that is situated around Likuang Village has a mixed characteristic of vegetation which consist of four to eight species (Figure 5). Indonesia is a tropical country that has the characteristics of seagrass pastures with high species diversity and mix vegetation (Hemmings & Duarte 2000).

The five type of seagrass found in the study site is a seagrass species which favored by Dugong and its preference while foraging. According to De Iongh et al. (1997) Dugong in the Lease Islands (Moluccas) have a preference of eating seagrass in such sequence as follows: *Halophila ovalis*> *Halodule uninervis*> *Cymodocea rotundata*> *Cymodocea serrulata*> *Thalassia hemprichii.*

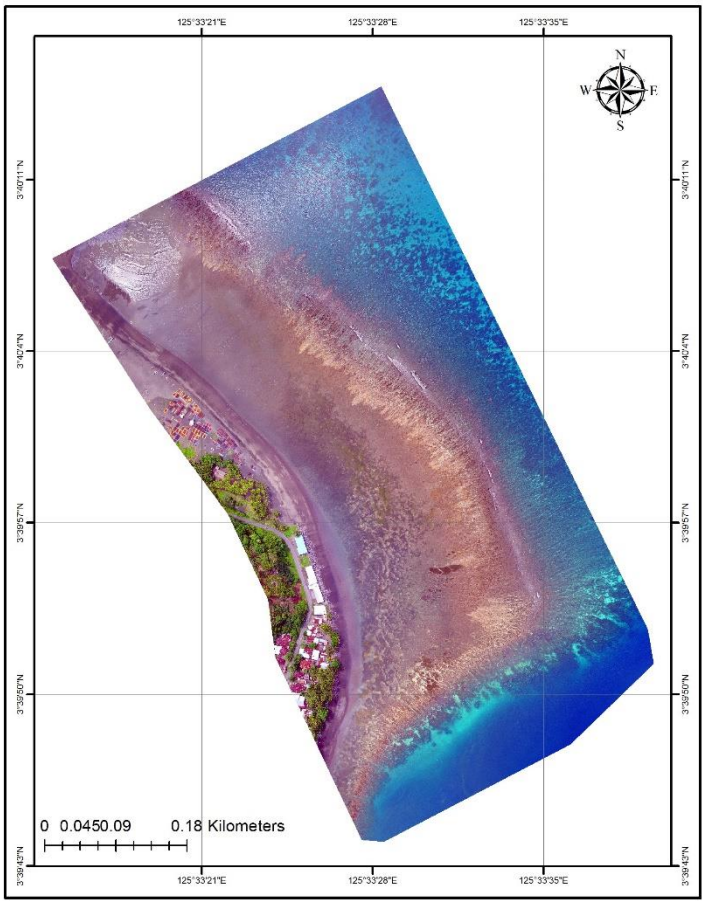


Figure 6. Dugong Foraging Habitat in Likuang Village

Seagrass Cover

Seagrass cover in a waters is closely related to habitat or morphology and the size of seagrass species. High seagrass density and tidal condition during the observation also have significant influence on the estimation of seagrass cover.

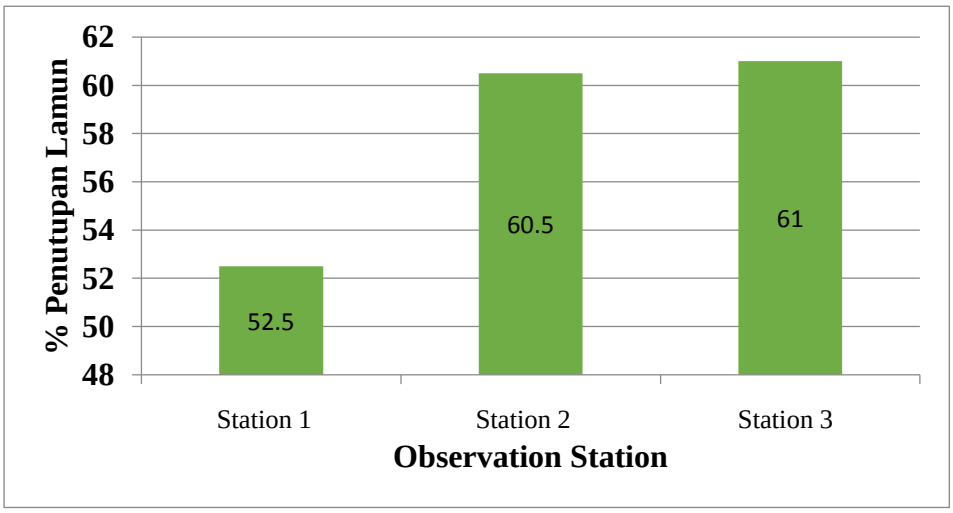


Figure 7. Graph of Seagrass Cover in Dugong Foraging Habitat

Based on the observation in research site, station 2 and 3 have a value of 60,5% and 61,5% respectively of seagrass cover. According to Ministerial Decree of Ministry of Environment No. 200, this result shows that the seagrass condition in both station may be considered as “rich” or “healthy” (≥ 60%), while seagrass cover in station 1 is considered as less rich or less healthy (30%-59,5%) since the station only cover 52,5% (Figure 7).

The level of seagrass closure is also strongly related to the density and morphology (size) of constituent seagrass species. High seagrass closure is generally dominated by species with large morphology (*E. acoroides* and *T. hemprichii*). One species of *Enhalus acoroides* will have higher cover value than one species of *Halodule uninervis*, since *Enhalus* species has a bigger leaf size. On the other hand, a smaller seagrass species such as *Halophila ovalis* will have smaller percentage of cover.

Seagrass density

Seagrass densitiy per unit area depends on the species that grows above it. Seagrass species which has high erect density may also have high frequency of habitation and coverage

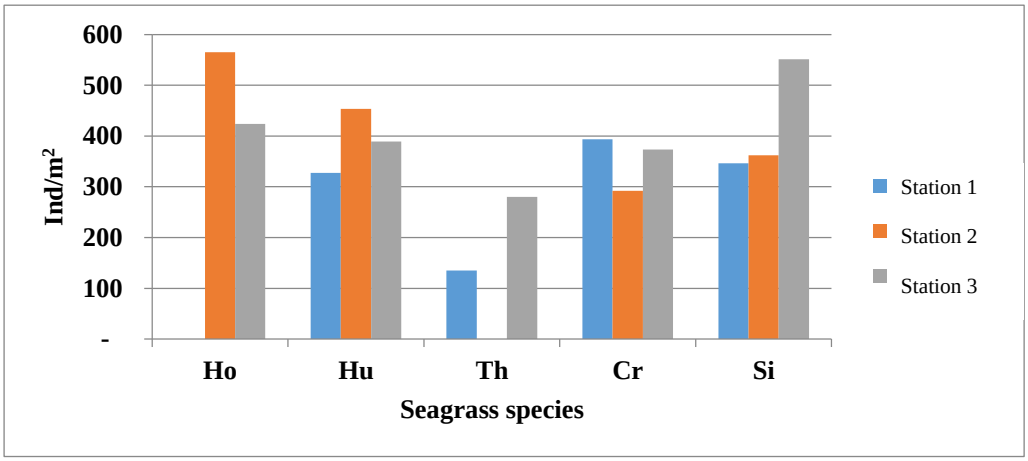


Figure 8. Seagrass Species Density in Dugong Foraging Ground

Based on examination of seagrass in research location, the highest density is inhabited by Halophila ovalis by 424-565 shoots / m2 (Figure 8). *Halophila ovalis* is a type of pioneer seagrass that can survive through poor condition or under disturbance and has a fast growing rate. It is then followed by the type Syringodium isoetifolium by 347-552 shoots/ m2. Syringodium isoetifolium a seagrass species which is able to adapt in waters up to 15m and has a stick-like appearance cylindrical body. Zieman (1986) points out that the seagrass density in a certain area may be influenced by abiotic factors such as water transparency, circulation, depth, substrate and nutrient contents.

Seagrass biomass includes all living material in a certain per unit area, that grow either above or below the substrate. Based on analytical result, seagrass dry weight is 87,32 gr/bk/m^2.

Biomass variability correlates to environmental variable, namely light condition, temperature, sediment characteristic, and the local nutrient availability (Dennison & Alberte 1985). In addition, Fortes (1990) stated that the amount of biomass of seagrass is not a function of the size of the plant, but also a function of the density. One of many influences of plant biomass is the presence of one dominating species (Hemminga & Duarte 2000), since it is related to the plant morphology and varying degree of growing rate among seagrass species. (Vermaat *et al* 1995).

Feeding Trail Identification

Based on the identification of feeding trail, Dugong which forage on seagrass does not eat it by placing his mouth on the substrate, but only cropping the types of seagrass which become its favorite, (there is documentation on feeding Dugong). Preen (1995) said that one of the strategies undertaken by Dugong when foraging the seagrass is cropping, which only took part of the leaf blade and leaf midrib only. Thus, the sediment is not "stirred", and the activity of cropping does not cause a cloud of sediment and leaves no feeding trail.

Besides cropping, there is also found traces of "spotting"; feeding trail left by Dugong by taking the whole body of seagrass, from the root to the leaves. However, "spotting" trail will be formed only at certain points. This way of eating is different from the grazing which form longer lines or feeding trail.

Population and Behavior of Dugong

Dugong is a marine mammal that lives in the shallow waters, especially in the area of seagrass. Based on visual observation using a binocular, scuba and drones, there were three Dugongs found who were active in the village of Likuang.

According to the information retrieved, in the monitoring which was conducted in 2015 by local people by using drones, there are eight Dugongs captured by the camera in in seagrass beds (Figure 9) and two other Dugong were found in play ground.

Figure 9. Four Dugongs in Seagrass Habitat

Likuang village, District of North Tabukan has 2 habitat used by Dugong for its activity, which is the "foraging habitat" (Figure 6) and "play groung" (Figure 10). On foraging habitat, there are five seagrass species found which are favored by Dugong, as described in foraging habitat section above. While in "play ground", there is only quite spacious sand with overgrown of little seagrass species *Halophila ovalis, Syringodium isoetifolium* and some rocks around it (Figure 9),

Figure 10. Sand overlay which is overgrown by thin seagrass species of *Halophila ovalis* and *Syringodium isoetifolium*, at Dugong Playing Ground.

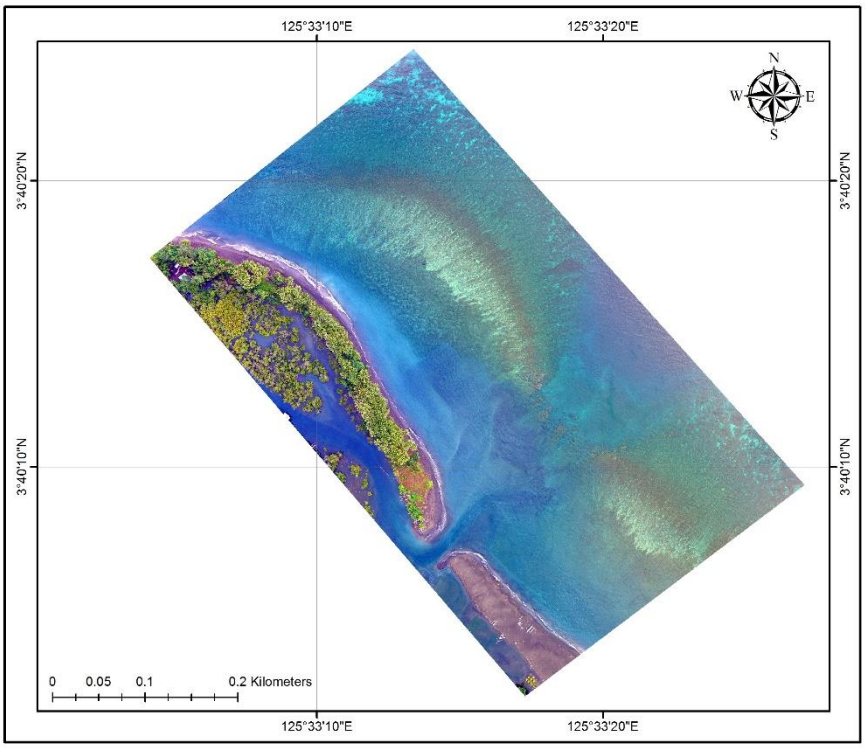


Figure 11. Dugong Playing Ground in Likuang Village

Most favorable activities of Dugong in its foraging habitat is eating seagrass, and occasionally interact with other Dugong. At the foraging habitat, there were two Dugongs found that are performing such activities in this habitat (Figure 12) after spending the time to forage, both Dugongs headed to playing ground.

Figure 12 Active Dugong in Foraging Habitat

In Dugong playing ground, there is a stone called the Batu Duyung (mermaid stone) (Figure 13). This stone periodically visited by Dugong and the species seems like performing a "ritual". Such rituals which were performed Dugong are rolling and swimming roundabout the stones. According to local people this stone has been there from a long time ago, the ancestors were also often told about the existence of the mermaid stone and ritual activities which are

often carried out by Dugong. The morphology of this stone does not have great size and shaped like a turtle.

Figure 13. Batu Duyung

In the playing ground there was one male Dugong found with size of ± 2.5 meters. The male Dugong was swimming around (traveling), emerge to the surface to breath (surfacing), flip (rolling), with limbs supporting the body during making turn and occasionally scratching his back on the sand (Figure 14 and 15).

Figure 14. Swimming Dugong in Playing Ground

Figure 15. Dugong in Playing Ground A) *Rolling*. B) Scratching. C) Turning with limbs D) *Surfacing*.

Based on the result of aerial survey, there is a pattern of activities undertaken by Dugong at the time it moves from foraging habitat to playing ground. Dugong will swim into the sea by passing the gully it moves into a deeper sea, and then goes toward the playing ground. At the time of exiting foraging habitat or playing ground, Dugong will pass through the gully (Figure 16).

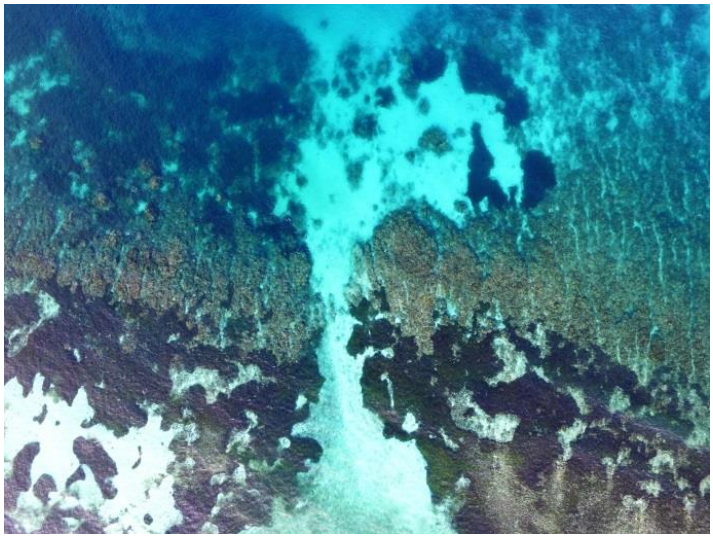


Figure 16. Reef gap used by Dugong to enter or exit its playing ground

Threats on Dugong and Seagrass

Dugong dugon is a species of marine mammals that are very sensitive to environmental stress. Its existence in Likuang village is already known by the public for a long time, but

people have never done any threat to either hunt or trap him with a *Tobak* net. People frequently see Dugong at the time they are heading to fish or while doing other activities in the waters of Likuang village. Fishermen in the village use fishing line of longline to catch fish and the case of accidental catch of Dugong has never occured. Stranding event of Dugong had occurred in early 2016, when the two adult-size Dugong swam and stranded into a river near by the playground when the tide was high. At that time, the effort to release back the species was successfully done by the community

Based on the interview, there has not been found Dugong with back wound despite of crowded motor-vehicle traffic in the area. Looking at the area map of the island of Nusa and Bukide, boat strike incident of Dugong has never occured. However, the need for good regulation on large ship cruising line, so that the Dugong population in this area can be properly maintained.

Nowadays, threats on the survival of the Dugong in Likuang village is tourist activity. Dugong in Likuang village can be easily found and already documented by the mass media, such as television and radio. This causes many foreign or domestic tourist to watch or see this rare mammal directly.

Such activities, if it is not regulated properly and if it is unsafe, will impact negatively on the sustainability of this mammal. Dugong that is already settle down its life and routines in Likuang waters may travel to other places, looking for a more comfortable, a place with minimum disturbance, and a place in which its favourite feed grows plentily.

SUMMARY

Basedon the result of the study, it can be summed up that:

1. There are at least te dugongs that live in Likuang Village waters, District of North Tabukan, Sangihe Islands
2. The distribution of Dugong in Sangihe Island is scattered in Batuwingkung, Beeng (mainland and waters), Binebas, Simunge, Lesabe, Manganitu, Tidore, Likuang, Nusa Tabukan Nanusa, Bukide, Peta and Embuhanga.
3. There are five seagrass species identified from two major families: 1) Family of Hydrocharitaceae (*Thalassia hemprichii* and *Halophila ovalis*). 2) Family of Potamogetonaceae (*Cymodocea rotundata, Halodule uninervis* and *Syringodium isoetifolium*). These five species are Dugong preferred feed.
4. Threats that may disrupt the sustainability of Dugong is unorganized tourism activity.

REFERENCES

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.

Hemminga MA, Duarte CM. 2000. *Seagrass Ecology*. Australia :Cambridge University Press.

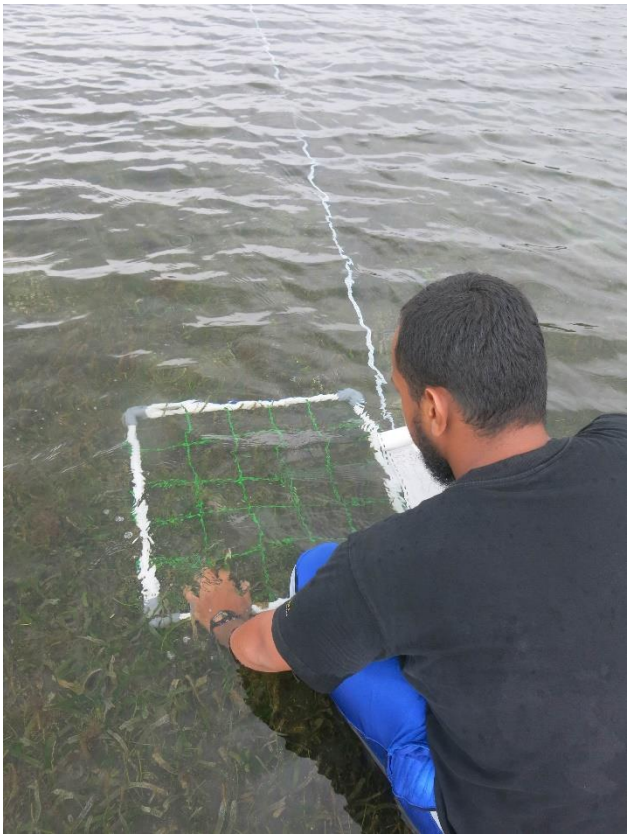
Preen A. 1995. Diet of Dugongs: Are they omnivores?. *Journal of Mammals.* 76(1),163-171.

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

APPENDIX

Appendix 1 Visual Survey (Binocular, Drone and SCUBA)

Appendix 2 Identification on Foraging Ground



Appendix 3. Questionnaire form

QUESTIONNAIRE

Interviewer: ……..Date …….Data Sheet Serial Number ……..

City/ Village …….Province……..

DECLARATION

Note: Reading out the statement to the respondent is obligatory. This will guarantee that all the respondents receive the same treatment

I am ……. I work for the project conducted by …….
Which is an organization based in …….. (*provide location*) which support the protection of the sea for fishermen and wildlife. The purpose of this project is to study further about the capture of Dugong in ……..(*provide location*). We intend to ask questions/questionnaires to you about Dugong you have seen, fishing gears you are using (if any), in which you catch, and such other questions. We provide maps and images/photos that can be used to help answering some of the questions we asked. Questions/questionnaires will take approximately 30-45 minutes to be completed. The results of our research can be used to help reduce the capture of Dugong, perhaps through direct support from the community, or also with the regulation and effective law enforcement. Your participation in this survey is voluntary and confidential. We will not record your name or personal information that you convey to us, unless you give your consent. Individual answers will be combined and reported as a group to get an overview about the current status, and we are definitely not going to deliver your individual answers to anyone beyond our research team. You don't have to answer the question if you do not wish. THANK YOU FOR YOUR PARTICIPATION.

RESPONDENT BACKGROUND

(*Tick the boxes on the left for the question which is not asked. Prepare a favorable map for the respondent to help pointing out location*)

☐1. Name ……

☐2. Age …….. Sex: Male ☐ Female ☐

☐3. Have you ever participated in an interwiew which relates to:

Fisheries ☐ Marine mammal☐ Marine Protected Area☐ Ecotourism ☐

Sea turtle ☐ Others ☐ Never ☐

When did you participate in the interview? ……

Explain …….

☐4. What is your primary job?

Fishermen ☐ Tour guide ☐ Sailor ☐

Others ☐ Explain …….

☐5. How many years have you been doing your current job? ……..

☐6. Do you have any fisherman background? Yes ☐ No☐

☐7. Are you parents fishermen? Yes ☐ No☐ Grandfather? Yes☐ No☐

☐8. Is fishing your primary employment? Yes☐ No☐

☐9. Is fisherman your only job? Yes ☐ No☐

(*If not*) What is your alternative job? ……..

☐10. In what month do you usually go fishing (in the last 12 months)? ……...

(if it is seasonal, explain when the season start and end) ……..

☐11. How many days in a week do you usually go fishing? ……days (during low season)

……days (during peak season)

☐12. What is your position in the boat/ship? Helmsman/ pilot ☐ Cabin crew ☐ tentative ☐

not work in this field ☐

☐13. How many people who work in your boat/ ship? ……

☐14. How long is your boat/ ship (in meter)? ……..

☐15. Is your boat/ship equipped with engine? Yes ☐ No ☐

(If Yes) : inboard ☐ outboard ☐

☐16. How much is its horsepower? ……

DUGONG CAPTURE

☐17. Have you ever seen Dugong in your waters? Yes ☐ No ☐

What is other nickname of Dugong in your place? ……..

☐18. Explain the different between Dugong and Dolphin ……

…….

☐19. In your opinion, how long Dugong can live? …….. Do not know ☐

☐20. When do you see Dugong? While fishing ☐ On sail to fishing site ☐ when it is caught accidentally or entangled in fishing net ☐

Haunted ☐ Stranded on the beach ☐ Others ……

☐21. How often do you see Dugong? Never☐ Once in my lifetime☐ Several time in my lifetime☐ Frequently ☐ Every year in the last 5 years ☐ Once in the last 12 months ☐ Several time ☐ Every month ☐ Every week ☐ Every day ☐

☐22. In what month do you usually see Dugong? (mention month and/or season) …….

☐23. When did the last time you see Dugong? ……(If it was a quite long time, mention the year)

☐24. Do you know the place or spot in which Dugong is regularly seen? Yes ☐ No ☐ *(Note: Regular/periodical indicates that Dugong is repetitively seen in the same period of time every year)*

Where is this location?? (*Point the location on the map given*)

☐25. Do these locations change over the time? Yes ☐ No ☐ Do not know ☐

☐26. According to your estimation, how many Dugong that lives in this area? 1 ☐ <10 ☐ >10 ☐ Do not know ☐

☐27. Have you ever seen Dugong calf? Yes ☐ No☐ When? …… (*what month*). Where did you see it? (*ask the respondent to point the location on the map*).

☐28. Are there any people or community form other village who catch Dugong? Yes ☐ No ☐ Do not know ☐ (*If yes*) How many person)? ……. Which village? ……..

Can you explain in more detail? ……

Is the capture intentional or accidental? Accidental ☐ Intentional☐ Both☐

☐29. Are there any great hunters in your village? Yes☐ No ☐ How many person?

☐30. Is there anyone or any community that catch Dugong in your village? Yes ☐

No☐ Do not know☐

(*If yes*) How many person? ……. For how long? …….in more detail? ……..

Is the capture intentional or accidental? Accidental ☐ Intentional☐ Both☐

☐31. Have you, yourself , ever caught Dugong for the past years? (*either intentionally or accidentally*).

Yes ☐ No☐ (*If yes*) How many Dugong that you caugh? 1-2 ☐ <10 ☐ >10 ☐ In more detail (*if any*) ……

Is the number of capture considered as normal in a period of one year? Yes ☐ No☐

(*If No*) Is that number higher or lower than the usual? Higher ☐

Lower ☐

Is it accidental capture of intentional hunt/ capture? Accidental☐ Intentional☐

Both ☐

☐32. How many Dugong that you have caught for the past 5 years? 0 ☐ 1-2 ☐ <10 ☐ >10 ☐ In more specific (*If possible with numeral*) ……

☐33. How do you catch Dugong? Using harpoon ☐ Using net ☐

Other method ☐ Explain……

☐34. Compare to when you first started becoming a fisherman, is the Dugong caught:

More than before ☐ Less than before☐ Quite the same☐ Do not know☐

(*Note: this testimony is based on actual numbers, not perception*)

(*If more or less than before*) What makes you think that way? ……...

……..

☐35. What will/ do you do when you catch Dugong intentionally? Consume it☐ Sell it ☐

Make fish bait of it☐ Others ☐

…… (*Note: Do not guide respondent*)

☐36. What will/ do you do when you catc Dugong accidentally? Dispose it (*when dead*) ☐ Release (*when alive*) ☐ Consume it☐ Sell it☐ Make fish bait of it☐ Others ……

☐37. Have you ever found ☐ or heard☐ Dugong which is stranded on the beach?

Yes☐ No☐ (*Explain*) ……

Or, have you ever found ☐ or heard☐ Dugong which died and float in the waters?

Yes ☐ No☐

Or, have you ever found ☐ or heard☐ Dugong with scars on its back? Yes☐ No☐ (*explain*) …….

(*If yes*) Where is it, when is it and how many? (*ask the respondent to point location on the map*) ……..

What happened next to the Dugong? ……

38. What will you do if you discover a Dugong which is stranded on the beach? ……..

……

SEAGRASS

☐39. Have you ever seen this plant?

Yes ☐ No☐

(*If yes*) Where do you see it…….....……

☐40. How many type (species) of seagrass that you know?

☐41. In which depth you may see seagrass?

0-5 m ☐ >5-10 m ☐ >10-15 m ☐ >15-20 m ☐

☐42. How is the seagrass condition recently compare to the past?

☐43. How do you feel if you are no longer able to see seagrass?

PERCEPTION

☐44. Compare to when you first started becoming a fisherman, do you think the number of dugong:

Becomes more ☐ Becomes less ☐ Quite the same ☐ ? Do not know ☐

☐45. Do you think Dugong has always to be in the water?

Yes ☐ No ☐ Do not know ☐

☐46. Do you think the presence of Dugong is important?

Yes ☐ No ☐ Do not know☐

☐47. Do you know what seagrass beds/ meadows is?

Yes ☐ No☐ (*Note: Interviewer showing the pictures*)

Is there any seagrass beds/ meadows around your place?

Yes ☐ No☐ Do not know ☐ Where is it?

(*Note: the interviewer insert/ point on the map*)

Do you fish on or around the seagrass meadow? Yes ☐ No ☐

Does seagrass meadows have any vital role? Yes ☐ No ☐

Why? …….

☐48. Is catching/ hunting Dugong against the law? Yes ☐ No☐ Do not know☐

What if the Dugong caught accidentally in the net is it against the law?

Yes ☐ No☐ Do not know☐

Will you report the accident to the related- local institution?

Yes ☐ No ☐

In more detail (*If Any*) ……

☐49. Is the waters patrolled or monitored regularly? Often ☐ Occasionally ☐ Never ☐

Do not know ☐

☐50. If yes, has the law/ regulation being enforced? Often ☐ Rarely ☐ Never ☐

Do not know ☐

☐51. Is there any custom, belief, fairytale or worship that is related to Dugong? Yes ☐ No☐

(*If Yes*) Explain……