



Report

PRELIMINARY FIELD SURVEY ON DUGONG AND SEAGRASS ECOSYSTEMS

West Kotawaringin, 10 – 16 October 2016

Organized by:

**Ministry of Marine Affairs and Fisheries
Research Center for Oceanography - LIPI
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WWF-Indonesia**

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Social Aspect and Community Perception of Dugong and Seagrass Conservation Program in West Kotawaringin

I. INTRODUCTION

1.1. Background

Dugongs are herbivores mammals that live in shallow water, spreading from the east coast of Africa to Vanatu in southeastern Papua New Guinea. The distribution of dugong in Indonesia is very thorough and almost spread throughout the shallow waters of the Indonesian ocean. Its presence in Indonesia is very difficult to find, only in some areas of eastern Indonesia, like Sangihe, Alor and Papua. Marsh (2002) predicted that by 1970, the population of dugong in Indonesia was about 10,000, but in 1994 its population was reduced to 1,000. Apart from its presence that is difficult to find, dugong, also belongs to the category of protected animals and IUCN included the species as vulnerable to extinction.

Through a joint collaboration between the Ministry of Maritime Affairs and Fisheries (MMAF), Indonesian Institute of Sciences (LIPI), Bogor Agricultural University (IPB), World Wildlife Fund (WWF Indonesia), and the Global Environment Facility (GEF), a program in Dugong and seagrass habitat conservation efforts or better known as “Dugong and Seagrass Conservation Program (DSCP)” has been initiated. This program has been running since 2016, and is planned for accomplishment in 2019. Several locations in Indonesia, which will be the location of the implementation of the program have been selected. Those locations are Bintan, West Kotawaringin, Toli-Toli, and Alor.

Since 2008, many studies have been conducted on seagrass habitat in Bintan regency. From various studies, it was also known about the existence of dugongs there. However, little is known about the population of dugongs either specifically in the area as well as throughout Indonesia. Because of this reason, the region must be prioritized in the efforts to conserve the Dugong and their habitat.

In regards to DSCP program, preliminary survey for Dugong and Seagrass Habitat monitoring aims to provide the latest information of the condition and status in some locations which includes West Kotawaringin. This activity is the implementation of Activity 3.1.3 i.e conduct a preliminary survey on the location of the program, with a target output / Output 3.1. to know the status of the condition Dugong and Seagrass Habitat at the site. All the activities funded by the DSCP ID2-2102 program.

1.2. Purpose

The purpose of the preliminary survey for dugong and seagrass habitat monitoring is to determine the presence and general location of dugong, assesses the level of public awareness on the conservation of the Dugong and Seagrass Habitat, as well as mapping parties in the survey area.

I. MATERIALS AND METHODS

Field survey has been conducted at West Kotawaringin, Central Borneo Province on October 10th – 15th 2016. Data had been collected through key informant interview on 5 locations which are Bogam Bay, Sungai Bakau, Kubu, Keraya, Pulau Bay, dan Sungai Cabang (Figure 1 and Table 1). Target respondents were government staffs, local residents, and fisherman around research site.

Key informants interviews had done based on questionnaire on dugong sightings and residents perceptions of Dugong conservation program and Seagrass ecosystem using Bahasa Indonesia which has been developed and adapted based on CMS questionnaire (<http://www.cms.int/en/project/cms-unep-dugong-questionnaire-survey>). Questionnaire list then uploaded to Akvo Flow software and data collection can be accessed through Android based smartphones or tablets. Data which has been collected is available to be downloaded on: <https://wwfid.akvoflow.org/>.

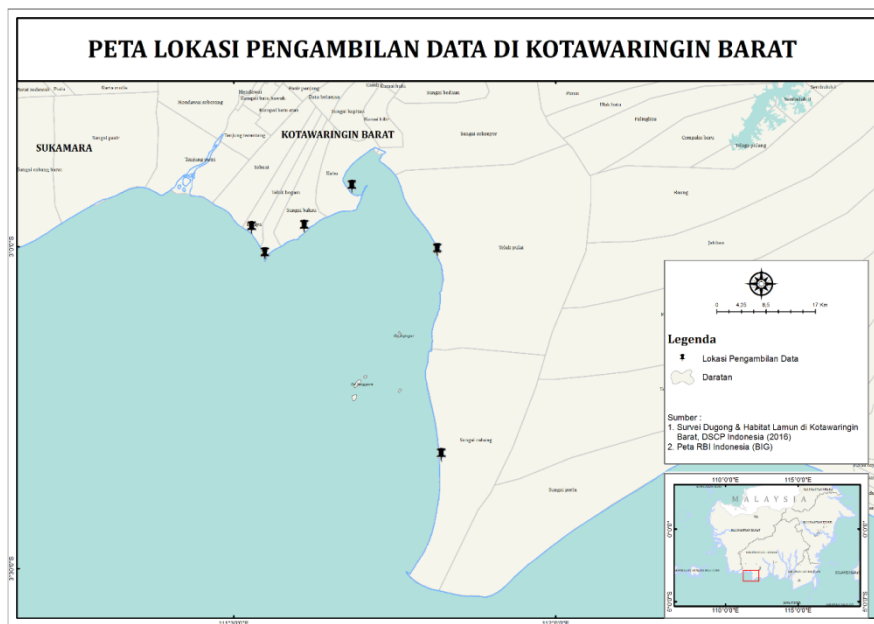


Figure 1. Target Locations and station for dugong and seagrass monitoring: (a) Bogam Bay Village, (b) Pulau Bay Village, (c) Sungai Bakau Village, (d) Kubu , dan (e) Keraya Village.

Table 1. Date and Location of Data Collection

Date	District	Village/Island
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11 2016	October	Kumai	Bogam Bay
12 2016	October		Pulai Bay
13 2016	October		Sungai Cabang
			Sungai Bakau
			Kubu
14 2016	October	Keraya	
15 2016	October	West Kotawaringin Regional District Administration Office	
15 2016	October		Bogam Bay

To form a mapping data besides from key informant interviews, forum Group Discussion (FGD) was facilitated by the team on 11 October 2016 in Bogam Bay Village and DKP was involved in hearings session on October 14th 2016. FGD involved local residents to discuss some statements as:

- 1) Threats to Dugong and Seagrass ecosystems.
- 2) Societal expectations for developing areas related to dugong existence and seagrass ecosystems.
- 3) Tourism development form based on societal expectations.
- 4) Local producing development program.

Hearings conducted by the team with DKP have been done to consign Dugong and Seagrass Conservation Project and to convey the result from the first field preliminary survey.

II. RESULT AND DISCUSSION

2.1. Key Informant Interview

2.1.1. Respondents Background

Survey team managed to interview 16 key informant (Table 2) based on residential distribution in Bogam Bay Village (7 orang), Keraya (5 orang), Kubu (2 orang), Pulai Bay (1 orang), and Sungai Bakau (1 orang). The majority of the key informants are male (81.25%).

Table 2. Name, Age, Gender, and Residency of The Informants

No.	Name	Age	Gender	Residency
1	Arsyad	60	Male	Bogam Bay
2	Syhrian	44	Male	Bogam Bay
3	Anang Suparman	42	Male	Bogam Bay
4	Misnah	50	Female	Bogam Bay
5	Misrah	50	Female	Bogam Bay
6	Idum	40	Male	Bogam Bay
7	Muhammad Yusran	41	Male	Bogam Bay
8	Muhammad Tarli	41	Male	Keraya
9	Abdul syukur	73	Male	Keraya

10	Ahmadi	48	Male	Keraya
11	Syafrudin	44	Male	Keraya
12	Mastora	62	Female	Keraya
13	Satlar	54	Male	Kubu
14	Ali Hanafiah	45	Male	Kubu
15	Gusti Arsip	55	Male	Pulai Bay
16	Dahrian	43	Male	Sungai Bakau

Sixteen key informants (18.75%) stated they had interviewed in regards with village competitions, marine conservation areas and village planning development. The interview about marine and seagrass ecosystem has never been conducted, however there was a public counseling regarding to DSCP by the Ministry of Marine Affairs and Fisheries. The majority of informant (81.25%) confirmed they have never been in any kind of interview before.

More than half of the key informants (68.75%) have never been educated / trained in association with skill enhancement activities. The rest of the informant (31.25%) claimed they have been trained/education vocationally associated to hawksbill sea turtle hatchery, family planning, mangrove, restriction in using trawl nets for fishing, agriculture and fisheries. The last workshop or training program which had been participated was in 1992 until in the beginning of 2016. 1992 sampai dengan awal 2016. Conducted by DKP Pangkalan Bun, BPSPL Pontianak, WWF Indonesia, Pemda, BKKBN, Forestry Regional Office, and Department of Agriculture.

According to the most of the informant (75%) claimed they frequently gathering information from the mass media. Mass media type that accessible by the informant are television, verbal information from residents/relatives, information board, and newspaper. This information shows the key informant relatively being opened to information and interaction from other areas and adequate access to get information.

The majority of informant (69%) said there have never been any dugong and seagrass conservation activity (or other type of conservation in environment and natural resources program) (Figure 2). On the other hand, quarter (25%) of the informant claimed there were some activities as socialization about endangered wildlife, seagrass cultivation and conservation in mangrove and seagrass.

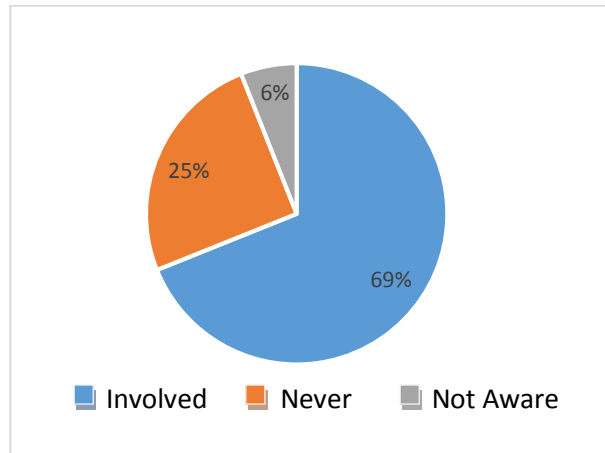


Figure 2. Respond related to dugong and seagrass conservation programs (or other conservation program related to environment and natural resources) before.

The majority of informant (68.75%) has main occupation as fisherman, as the rest of the informant works as the head village, farmer, and housewife. Furthermore, the rest of the key informant (81.25%) had experienced fishing with their parents who were fisherman, and 62.5% of them have grandparents as fisherman. This result shows most of the key informant has profile and strong background attached to marine and coastal resources because they have experienced it when they were kids.

More than half of the key informant who works as fisherman (68.75%) usually go fishing all year long, in Januari through Desember. There is no seasonal time because there are no main catch in their fishing activities. Every day in a month they are going for fishing. Nevertheless, the most secure time for them to go fishing is on East-Wind Season (April-October). On West Season with the strong wind coming usually on November-January they would go for fishing nearby the coast using fishing rod. Apart from what the men do, the women would help to collect some type of crabs, *belayung*, *simping*, *lokan*, *dan kopang* during low tides area and some snails and *ketuyung* on the seagrass field.

2.1.2. Dugong

Most of the key informant (93.75%) stated they have ever seen dugong at their territorial waters and they (87.5%) could differentiate between dugong and dolphin. More than half of the informant (60%) do not know how long is the lifespan of a dugong and less than half (40%) asserted that dugong has the same lifespan as human with maximal lifespan up to 65-80 years old. Local residence called dugongs as mermaids.

Based of survey results, there are information available concerning to dugong sightings and seagrass ecosystems (Figure 3). Seagrass ecosystems spreads along the coast of Bogam Bay until Kubu Bay and all around Gosong Beras Basah,

Gosong Senggora, and Gosong Sepagar. While dugong has been sighted often on the cape of Bogam Bay and Gosong Sepagar.

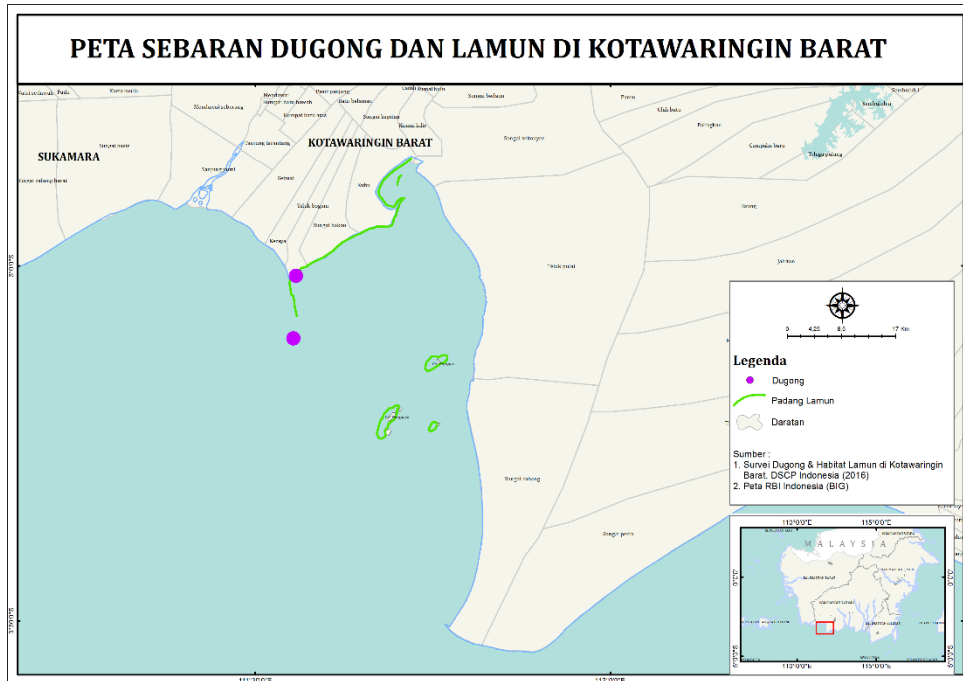


Figure 3. Map of Dugong Distribution and Seagrass Habitat

Based on Figure 4 dan 5, the majority of key informants saw dugong while fishing (40%). The rest saw dugong while sailing to the fishing ground, accidentally trapped in fishing nets or other fishing tools, and while hunted them down each percentage represents to 15% of the key informant. Dugong has been sighted as stranded on the beach, eventually dead, or sighted while took shelter by the beach (5%).

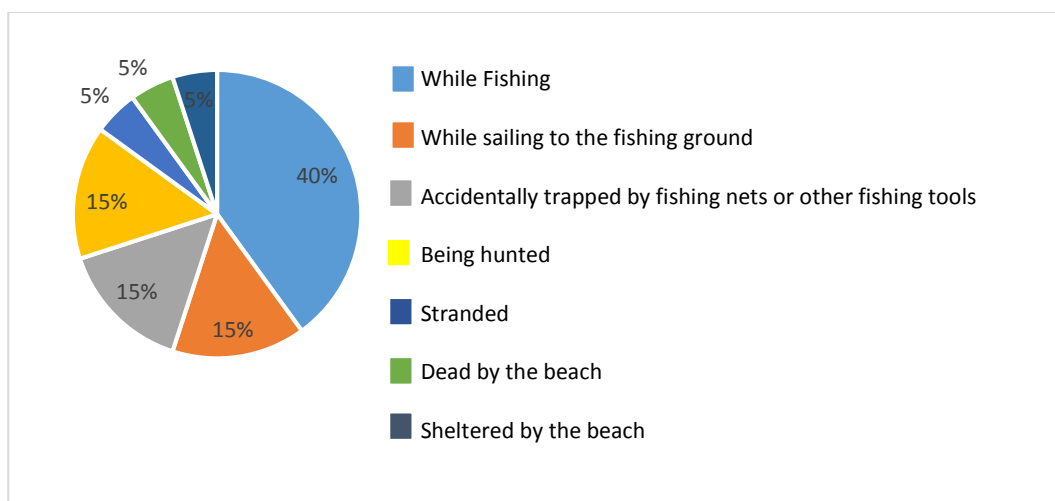


Figure 4. Respond related to intensity of dugong sightings

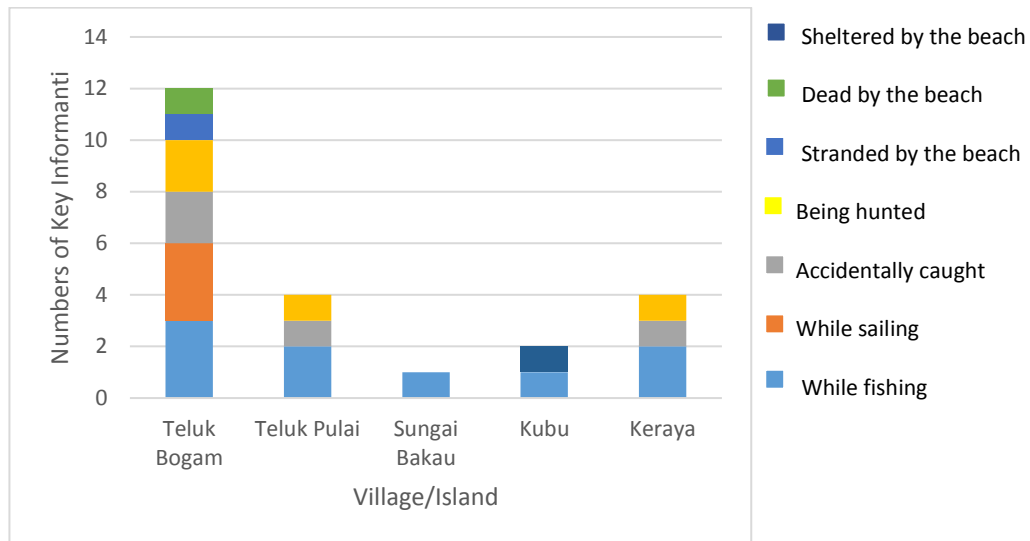


Figure 5. Respond according to timeline based on informant's residency

Less than half (38%) of the key informant claimed they have seen dugong often or for once in their lifetime. Two informants said they have seen dugong for couple of times (12.5%), each person said they saw it in the last 5 years (6.25%) and the other said never seen dugong ever. The timing when the dugong being sighted were varies from whole night long, every month, and around September to November, once said every beginning of the year from January until March and other said there is no exact time that they could remember of (Figure 6).

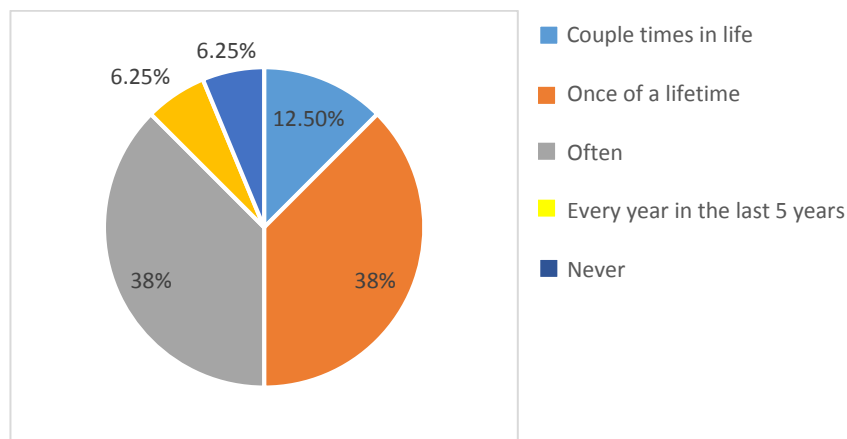


Figure 6. Respond related to intensity of dugong sightings

Key informant at Bogam Bay Village asserted they usually see dugong around Gosong Beras Basah, Gosong Sepagar, dan Gosong Senggora. Another informant from Pulau Bay, Sungai Bakau, Kubu, and Keraya explained that local residents in Bogam Bay, more intense for sighting and knows better about dugongs sighting locations. Because Gosong is an area where Bogam Bay people are going for fishing. The majority of key informant (60%) do not know whether the sightings based on time. A few informant claimed that the sighting location has been changed based on time (20%) and the rest (20%) claimed it does not change based

on the timing. More than eighty percent (86.7%) said they do not have any idea how many dugongs are living in their region, the rest asserted about 1 and less than 10 dugongs are living in the region. (Figure 7).

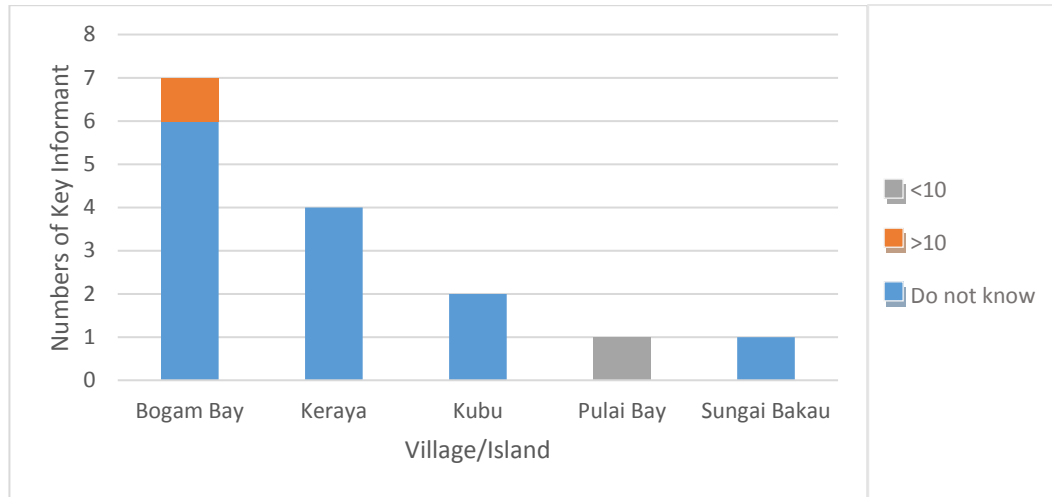


Figure 7. Respond according to numbers of dugong estimation

Almost half of informants (46.7%) stated they have seen baby dugong. Informant from Bogam Bay saw baby dugong in 2014 and in the end of 2015 at Gosong Beras Basah. Based on information from key informant from Keraya baby dugong had sighted in the 60's and in the beginning of October 2016 also at Gosong Beras Basah and also at Batu Babi. In difference with other informant from previous locations, informant from Kubu claimed in 2006-2007, he saw baby dugong at Tanjung Kluang and other informant from Pulau Bay stated saw a baby dugong on early January in 1970 at Pulau Bay Beach.

Based on informant from Bogam Bay's explanations there were one until three man who are expert in hunting dugong in the region, one man from Keraya, and for the rest of observation sites key informants stated there are no dugong hunter. Dugong deliberately being captured in 1971-1980, while in Keraya it happened in 1988. Hunting tools in mean time was spear and captured 3-4 dugongs in every hunt. However, it is no longer happened, the rest cases are incidental caught or trapped around Bogam Bay, Keraya and Kubu. At Bogam Bay and Sungai Bakau, no one ever caught dugong even deliberately or accidentally.

Couple years back, there were two informants from Bogam Bay who were a dugong hunter. One of them captured dugong in purpose of consuming and selling the meat and the skeletons and fangs were made for pendants and eye rings. In Keraya one of the informant said he purposely captured dugong in the 60's for being consumed and sold.

In the recent years there were some cases of dugong found already dead on the water or stranded on the beach. The events happened at Bogam Bay in 2008, at the end of Pantai wisata in 2010 and at Gosong Beras Basah in 2014. If founded

dead already some people tend to take the skeletons remains from causality. The critical threat that usually be the cause of death is being trapped in fishing nets. Dugong who got accidentally trapped in fishing nets occasionally being consumed if the meat still edible and not rotten.

Beside dugong, additional information about other charismatic species which frequently being spotted are dolphins, around Gosong Beras Basah (Figure 8). Dolphins oftentimes swimming by the fisherman's boat.

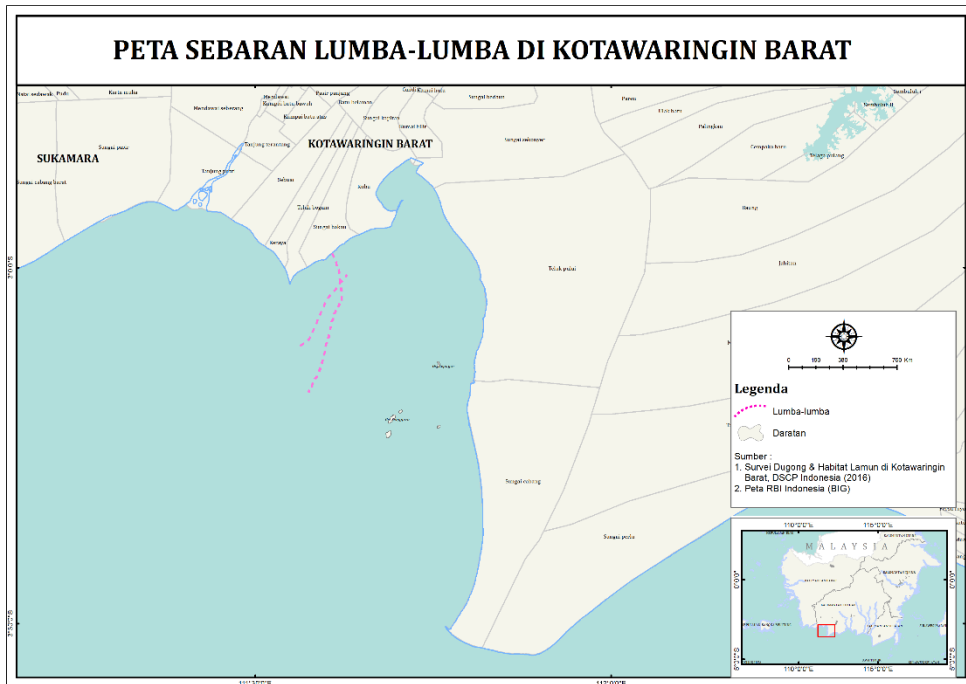


Figure 8. Distribution of the Dolphins Emergence Areas

Besides dolphins, sea turtles are often being seen along the coast of Sungai Cabang until Pulau Bay Village, right on the border of Tanjung Puting National Park (TPNP) either for laying eggs or just being sighted from the boat (Figure 9).

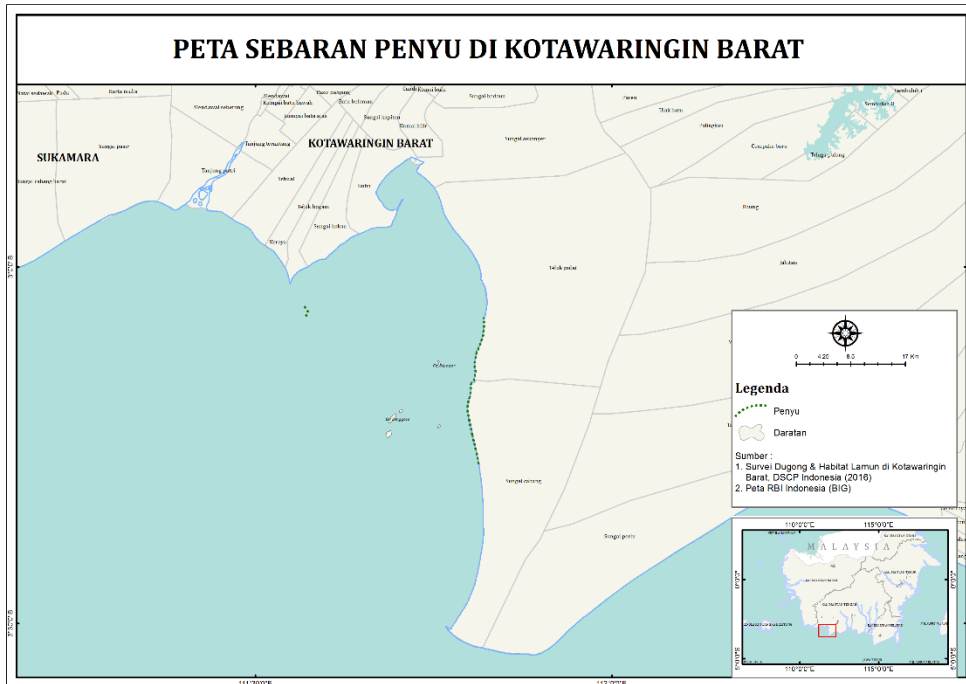


Figure 9. Distribution of Sea Turtles Sightings

2.1.3. Seagrass Ecosystem

Almost all of the key informant stated that they have never seen any of seagrass field in the region and only one informant who claimed that he had seen it before. Seagrass that have ever been seen consisted of 1-4 species (Figure 10) and could be found in 0-5 m depth (Figure 11).

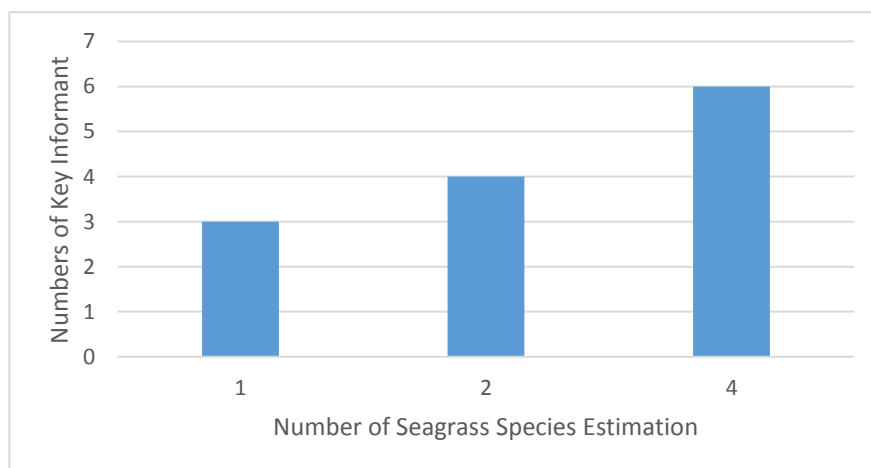


Figure 10. Respond according to knowledge of seagrass species

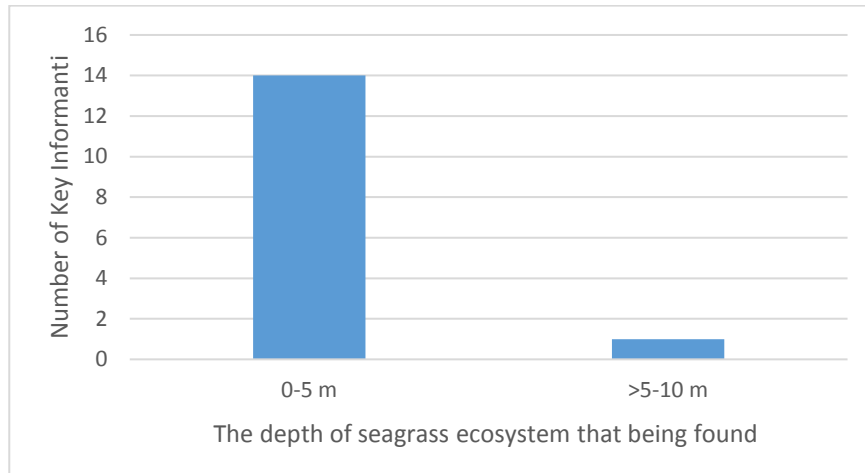


Figure 11. Respond according to the depth where seagrass ecosystem can be found

All of the informants said seagrass ecosystem is really important because the habitat of seagrass is a feeding ground. Majority of informants claimed that seagrass ecosystem is really important for their daily life too because seagrass ecosystem provides them resources as fish, prawns, and types of crabs and also it withstands the surge and huge waves during South-east season. In the other hadn 5 informants said the seagrass ecosystem is not important for their life.

2.1.4. Community Perception

In major 56% informant asserted the existence of dugong is important (Figure 12). Some of the reasons why people think dugong is important for them are because of dugong has a role to maintain the balance of nature and that is why dugong is protected, so that people who have never seen them has the chance to see them and just to know about the name only, the existence of dugong in the region also be considered as a tourism attraction, likewise as being socialized by DKP that dugong are being protected under the country law. In the past, before there is a prohibition law, dugong meat used to be sold for Rp 15.000/kg, now people sells the meat for Rp 40.000/kg if only the fisherman accidentally catch dugong and the dugong died in the case. This represents the community comprehension about dugong is slightly high and they expected their region could be a tourist destination in regard with dugong existence. However there are some community in the resident who is still utilizing dugong for consumption if captured accidentally in dead condition.

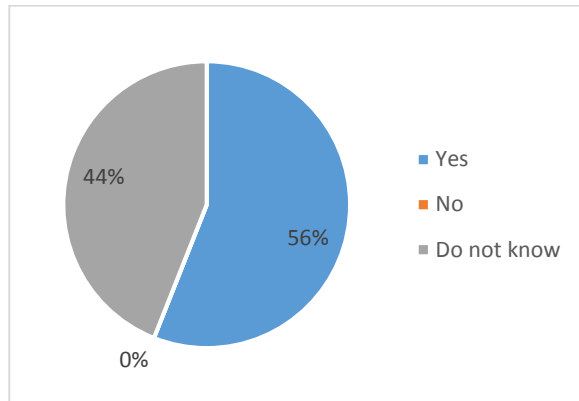


Figure 12. Community Perception about the Importance of Dugong Existence

As many as 33% key informant said the seagrass ecosystem condition becomes denser with more varieties of species, and it is in the same percentage of key informants who stated the condition becomes less or in the same state as before (Figure 13). Concerning about the utilizing of seagrass ecosystems, majority of informant (86%) gained earnings from collecting shells, snails and other type of edible small marine creature (Figure 14). Several marine biota which being consumed from the seagrass ecosystem are sea cucumbers, sea slugs, prawns, squids, prawns, *gamat*, crabs, mullet, *lokan*, *ketuyung lamun*, *ketuyung siput*, *simping*, *kapiting balayung*, clams, and *kipat*. To catch those type of marine biota, people used bare hands, nets, *raga* (a type of clothes basket), pans, unused rice bags, diving goggles, and arrows. Almost all (66%) key informant stated the importance of seagrass ecosystems towards availability of other marine creatures which being utilized for their daily life. There are also informants who stated that not all of those sea creatures only can be found in the seagrass ecosystem, some may be founded in sand with no seagrass at all.

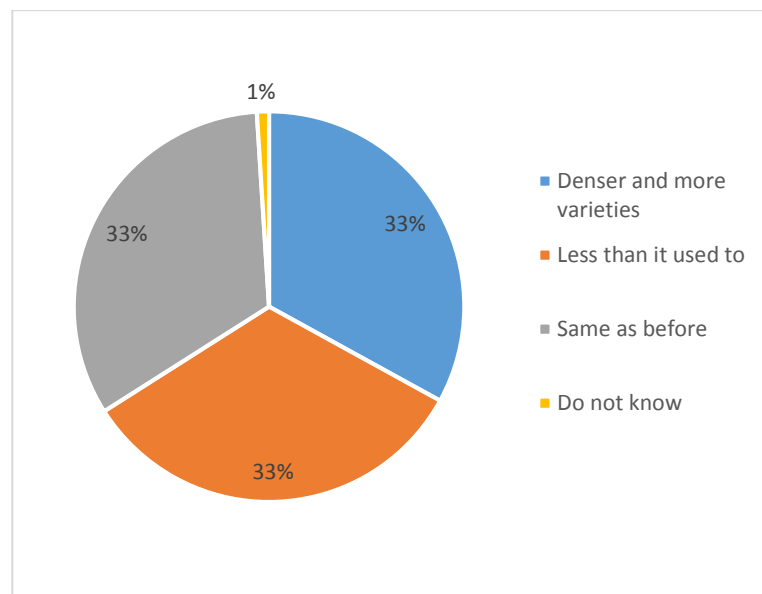


Figure 13. Community Perception about the changes on seagrass ecosystems

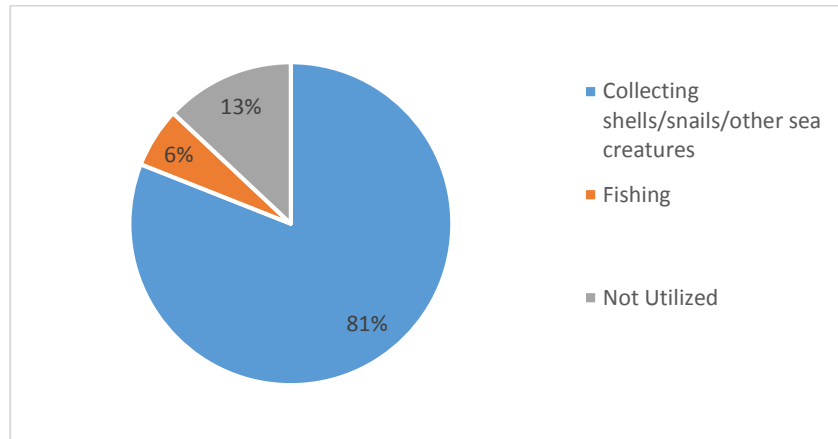


Figure 14. Respond based on utilizing seagrass ecosystems

Only 12.5% of key informant expressed the natural resources collecting activities has the impact to the damage of seagrass habitat and the statement is in proportion as some key informant explanations about seagrass ecosystem which been damaged could be restored if fisherman activities around the seagrass field is subsided and/or coming with ban regulation for fishing in the seagrass ecosystem in a period of fishing season. This survey result shows the community perception, their activities has no negative impact on the health condition of seagrass ecosystem.

The majority of informants (68.8%) are aware to capture dugong deliberately is against the law (Figure 15). Only 2 informants from Bogam Bay, 2 from Keraya, and 1 from Kubu who did not know it was against the law. Nonetheless, how about dugong which got captured/trapped in fishing nets accidentally, less than half (43.8%) stated against the law, some expressed the nescience (31.3%), and the rest about a quarter stated it is not against the law (Figure 16). Therefore it is necessary to conduct socialization or training for releasing trapped dugong to minimized threats of accidental captured by fishing nets.

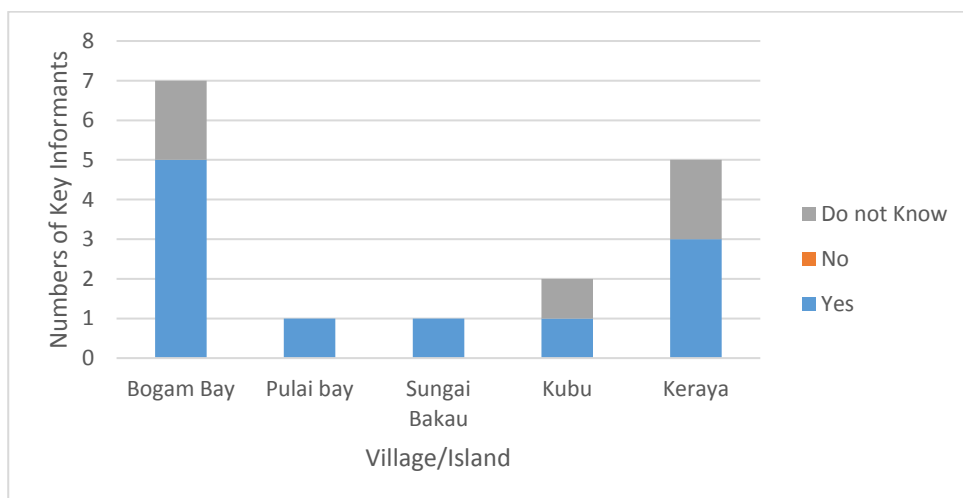


Figure 15. Respond concerning the awareness of state law for capturing dugong

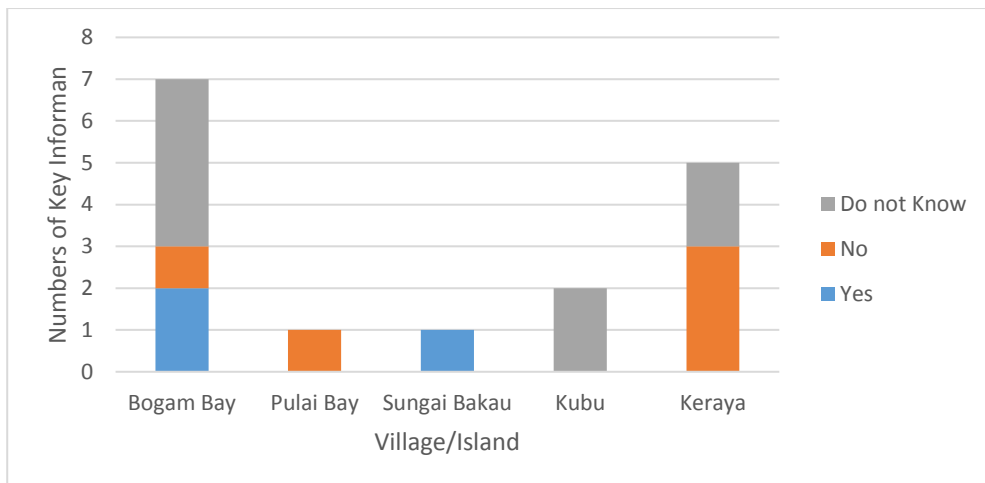


Figure 16. Respond in regard to accidental case of dugong which being captured

The majority of informant (62.5%) on every survey sites would report the capturing event of dugong in their region to the higher administration officer, except in Sungai Bakau and Pulau Bay (Figure 17). According to the informant they would notified the officer such as the head village or staffs and will be forwarded to DKP. Related to the case, officer should be equipped with adequate knowledge.

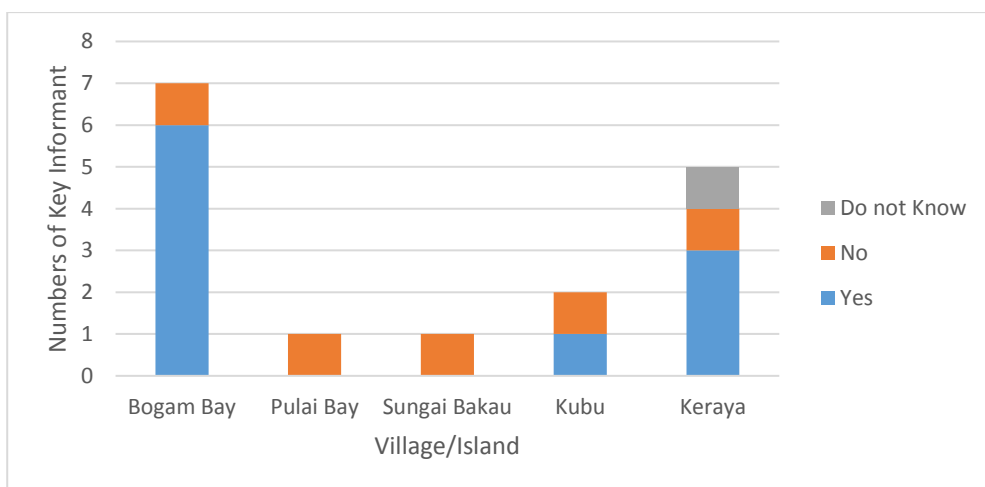


Figure 17. Community perception according to report unintentionally captured events of dugong to the local officials

Half of the informants (50%) stated they have never seen any marine patrol activities in their regions (Figure 18). But some of them (37.5%) had experienced to frequently see marine patrol conducted by DKP, marine police, and the navy.

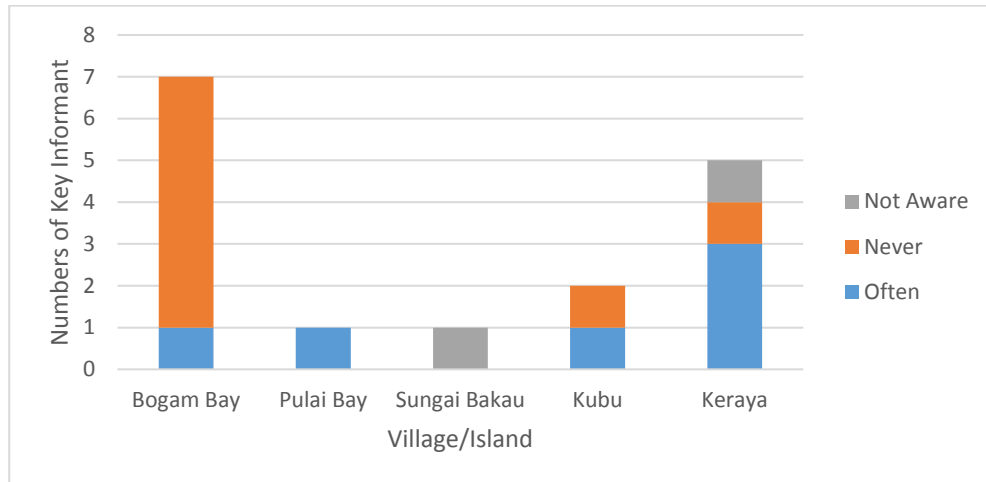


Figure 18. Respond according to routine activity of supervising and patrolling on the region

For the Kotawaringin coastal residents especially in Kumai, there are some stories/folklore about dugong and seagrass habitat. In Bogam Bay, the people believes that there were dugong sacrifices in boat with size of 2-2.5 meter which would sent to sail and given with spells. While the remaining skeletons which are not being consumed is kept in the home lawn to prevent pest animals such as boars, rats, etc. As for the fangs and teeth usually be arranged as necklace and told could treated asthma. In Keraya, the tears oftentimes is collected and mixed with coconut oil and people believe it would bring fortune and the bones used for smoking pipes. Another villages do not have any special folklore about dugong. While seagrass has a different story, once said if a person ate the seagrass fruit it could change the person into a dugong. There was a pregnant lady who was craving on the seagrass fruits and because she ate too much of the fruit she changed into a dugong.

More than half of key informant (62.5%) stated the government, public figures, community organization and/or private corporations tend to support the effort of marine and coastal conservation activities especially about dugong and seagrass ecosystems (Figure 19). The majority of informant (75%) has claimed they want to be involved and have a role and support in the attempt of dugong and seagrass conservations. Actions and events that had been submitted are stop capturing and consuming dugong, if there were a case of accidentally captured dugong they would release it. The community also expressed they would obey the law and involved with dugong and seagrass ecosystem conservations programs. The community is expecting there would built a monitoring post in Gosong Beras Basah to make sure dugong will be indwell in their regions and with public patrol the post could be a place for taking recess during patrolling in the region.

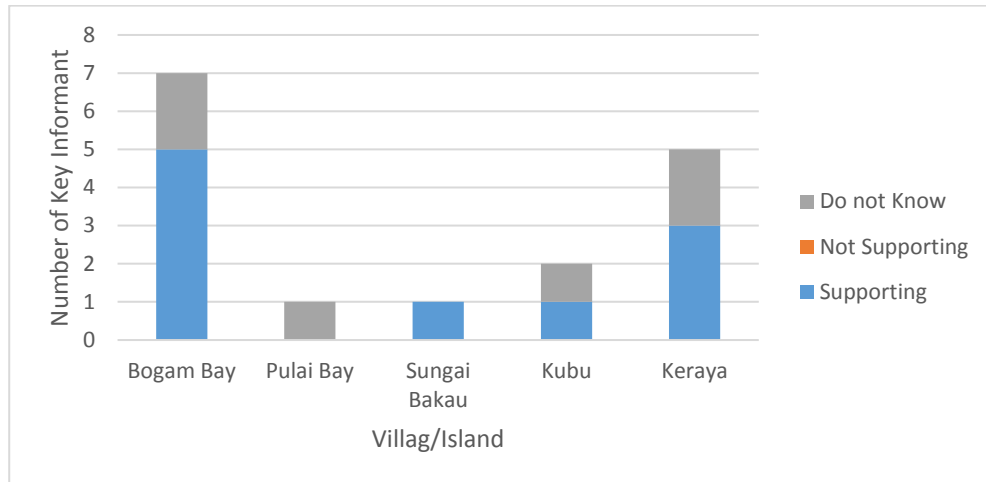


Figure 19. Community Perception in regards with the role of governments, public figures, community organization, and/or private corporations (e.g.: tourism resorts) about the effort for coastal resource conservation projects (especially for dugong and seagrass ecosystems)

Concerning to the question in the questionnaire about is there any impact on dugong and seagrass conservation activities from point a to j, two of informants did not answer them (12.5%) they are key informants from Pulai Bay who does not understand the questions and from Keraya Village who got a sudden family matters and could not manage to continue the interview. In association with population increase in the region (Figure 20a) the majority of informants (56.25%) stated it is not giving any impact to the conservation activities. This is because in their opinion people tend to stop exploiting dugong. As the result even though the human population is increasing it gives no effect to the dugongs in the region.

More than sixty percent of the key informants (62.5%) expressed there is no impact either from the increasing tourism facilities/activities (Figure 20b). The result of this opinion showed that the residents does not understand enough about tourisms. They assumed tourism activities only happened on the beach, just as an example which happens on the tourism beach in Kubu. Beside that opinion, most of the tourist attraction and activities concentrated in TPNP. Key informants from Bogam Bay also complained about their village land which got owned by foreigners and developed to tourist attraction but has not yet well managed.

The majority of key informants even though less than fifty percent (37.5%) stated the industrial/mining activities would give an impact to dugong and seagrass ecosystems, and more than ten percent (12.5%) expressed the strong agreement of influenced which will be given from industrial/mining activities (Figure 20c). The impact can be seen as an environmental damage, and would be possible for dugong to relocate to another region.

In the topic about garbage/waste disposal or the absence of managing garbage program/facility in the region, less than half of informant (43.75%) stated it would be influential to the dugong and seagrass ecosystem (Figure 20d). So far there are no manufactory which operating in all of the villages as the survey location sites so that there has not yet been any awareness of the direct impact of garbage/waste from industrial activities. Although the picture of what would happened if the garbage/waste really occurred they expressed that their residential would be terribly polluted.

More than half of the key informant (56.3%) asserted the climate change/weather patterns changing does not give any impact to dugong and seagrass ecosystems (Figure 20e). They explained it with an experience when there was strong wind and huge wave, they will not see any dugong around. Mereka menjelaskan hanya ketika angin kencang dan ombak besar dugong jarang terlihat, hal ini juga dikarenakan nelayan tidak melaut saat kondisi cuaca buruk. Whereas the intensity of activities from fisherman using motorized boat claimed to be not giving any impact by the majority of key informant (Figure 20f). Especially in Bogam Bay, Sungai Bakau, and Kubu which has the distribution of seagrass area along the coastline, some of the informant (37.5%) stated the seagrass field is being damaged because the motorized boat passing over and lean on around the area.

Exactly half of the informant (50%) expressed the fishing activities using harm way tools or chemicals which damaging the environment would give a huge impact to the seagrass habitat and to the dugong (Figure 20g). From five of the villages as the survey locations, all of the informant claimed in Kubu Village there are many fisherman who use bomb besides the fishing tools. The influence has been perceived by other fisherman from different region who stated their haul is decreasing nowadays. Key informants from Kubu Village themselves also expressed the discrepancy of using eco-friendly fishing tools to the use of bomb in fishing. Sometimes other fisherman suggested them to stop and reproach the negative side to them but those did not work. In this case, the community tend to use bomb to gain bigger haul in fishing because the haul inclined to come down nowadays

More than half informants (56.25%) expressed the unawareness from the community would affecting to dugong and seagrass ecosystem (Figure 20h). Even the key informants already have the cognition and awareness about dugong and seagrass, it is necessary to perform community assistance to increase the awareness.

The majority of the key informants (62.5%) stated the existence of conservation areas or even protected areas would give an impact to dugong and seagrass ecosystems (Figure 20i). This represented the socialization conducted by West Kotawaringin DKP regarding to the function and impact of conservation areas has a tangible result. The role of regional office especially for the community in

Bogam Bay has been conducting very well in socializing about protected and endangered animals.

One third of the informants (37.5%) restated the ineffectual activities of marine patrol/law enforcement to dugong and seagrass ecosystem (Figure 20j). This represents the management authority has never been in there for the community. Marine patrol only has been conducted by public and when reports being made because of there were violation, the follow-ups from the official always tend to be late.

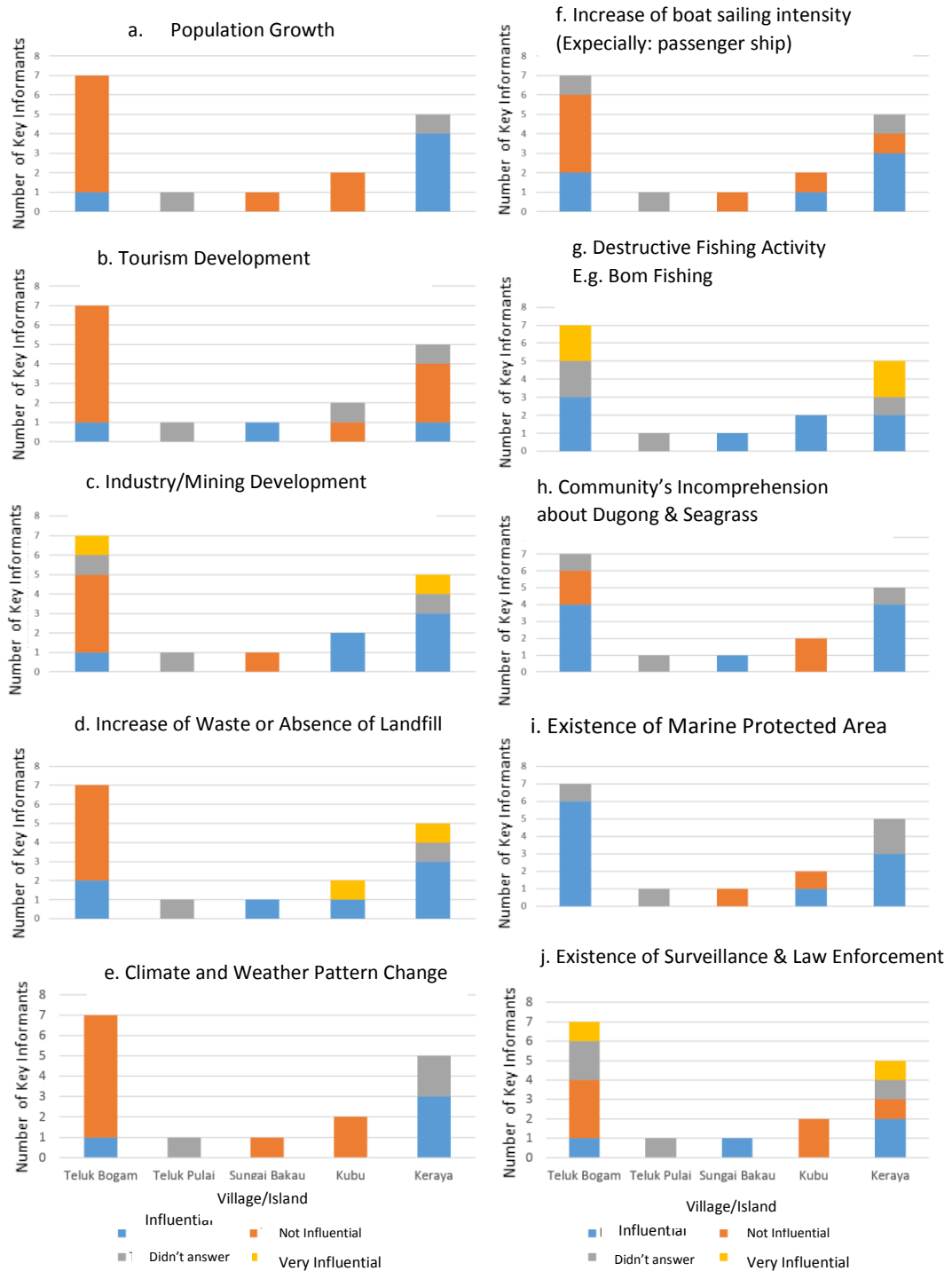


Figure 20. Social Perception in the local residents according to the factors affected to Dugong and Seagrass ecosystems

Figure 21 represented the community perception to the expectation of developing in their region in the form of infrastructure or even business venture. In the interview processed, two of informants from Keraya and Pulaui Bay did not answer the questions since there was a family matters occurred and the other just simply did not understand the questions. The majority of key informant (81.3%) agreed and strongly agreed in the improvement of road access (Figure 21a). Even though

the condition of road and access has already sufficed, the expectation is there would be a broadening construction for improvement and two way vehicles can passing by more adequately.

As well as motorization of fisherman's boat (Figure 21b) and residential development (Figure 21e) most of the informants stated an agreement and strongly agree of the planning (87.5%). The statement reckoned by most of fisherman in the survey locations still operating traditional fishing tools. Regarding to the development plan for hotel/resort (Figure 21c), malls/shopping avenues (Figure 21d), a little more than half of the informant (68.75%) declared to be agreed and strongly agreed. Despite of the opinions from informants there should be another consideration and further studies about the impact in conformity with local characteristic for community/territory.

Most of the informant (87.5%) disagree in the establishment of bar/night clubs (Figure 21f) because that is against the norms which espoused/applied by the residents. And it is proportionate to informant perception to preserve the local wisdom for the values or even folklore in the community (Figure 21g).

In regards of the closure regions to restore the seagrass ecosystems and coastal areas (local protected and conservation areas), half and almost of the informants (50%) expressed the agreement (Figure 21h). However, all of the informants from Kubu Village stated the disagreement to the statement because it would rendered difficulties for them to go fishing. In Pulai Bay, informants tend to agree on the statement because there are only 10 people left who works as fisherman. In general the resident works in swallow's nest cultivation and as labor/farmer of palm oil plantations. Along with the agreed statement, informants also suggested to discuss about this with everyone in the regions, if there were a disagreement then people should came up with solution in regards to closure region.

Development in marine tourism activities in support to dugong and seagrass conservation (Figure 21i) and improvement in home industry sectors which promoted the activities of marine tourisms (Figure 21j) were welcomed by the majority of key informant (87.5%) who stated agree and strongly agree on the statement. This perception is conformable by the previous statement about developing hotel/resort in the regions as a supported facilities, with expectations to start improve the tourism activities first before developing the hotel/resort. This stated so that the development would utilized thoroughly.

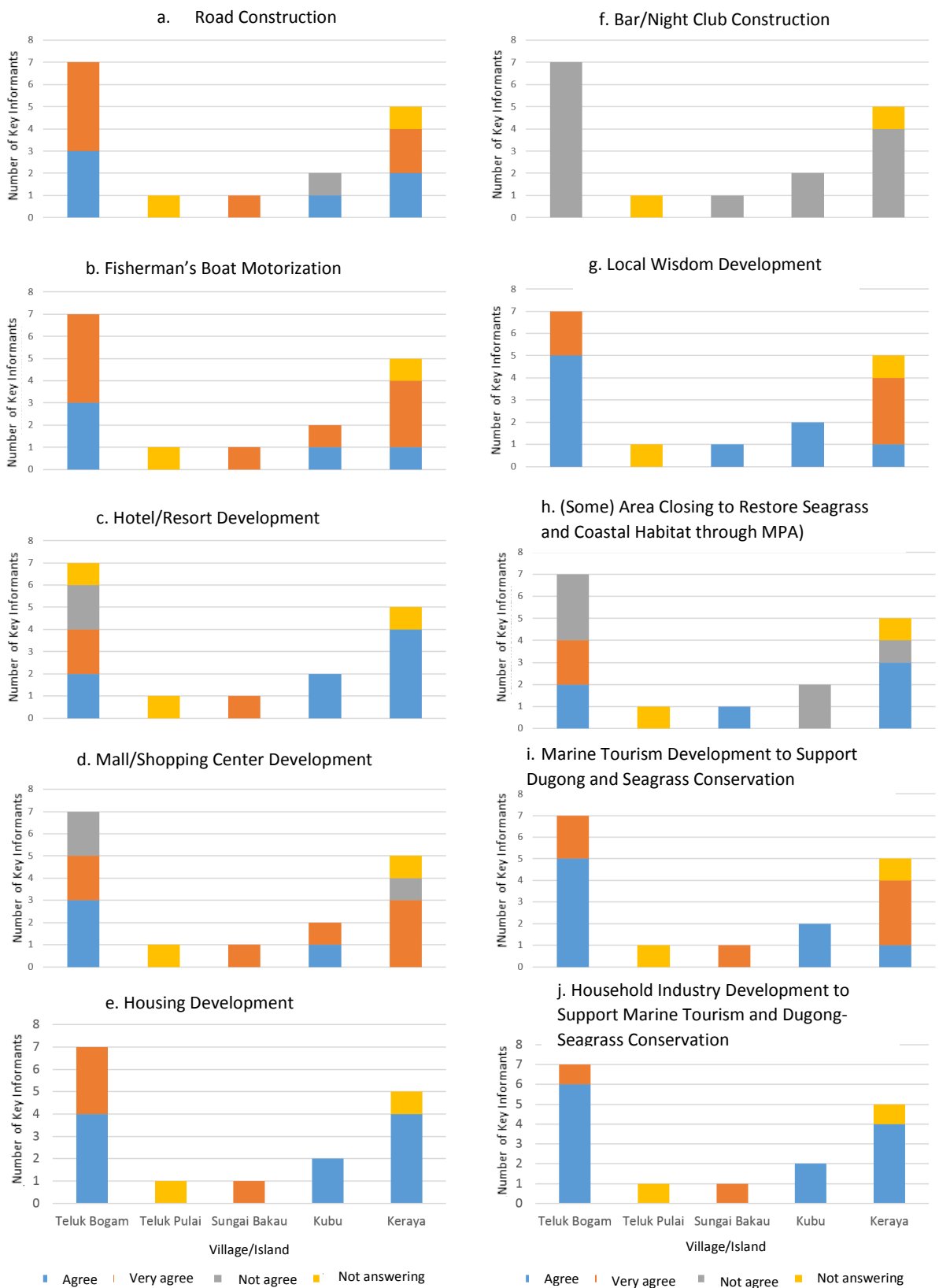


Figure 21. Community Perception throughout the Plan to Develop the Region

2.2. Focus Group Discussion and Hearings with DKP West Kotawaringin

Some of the main points as the result from FGD in Bogam Bay Village:

- Dugong distribution sighting locations in Gosong Beras Basah, Gosong Senggora, dan Gosong Sepagar. And seagrass ecosystem distributions along the coastline from Bogam Bay until Kumai Bay.
- Threats to Dugong and Seagrass Ecosystems:
 - a. Bycatch cases because being trapped in fishing nets
 - b. Ships/boats trajectory on seagrass field during low tides.
- Social expectations for developing the area related to dugong and seagrass: People expected that their residency can be developed as tourism destination.
- Developing form which been expected by the community in tourism sectors:
 - a. Currently, there are 135 hectare areas which targeted to be aquatic conservation areas in Bogam Bay and Sungai Bakau Village which already in agreement by DKP and the community.
 - b. Bogam Bay residents expects for a monitoring post to be built in Gosong Beras Basah for a dugong monitoring station by the community.
 - c. Tourism development needs to be done by other parties who comprehended about the areas and knows exactly what to do for eco-tourism improvement and development programs.
- Local manufactured products which can be developed:
 - a. Purun Webbing souvenir from pandan leaves.
 - b. Garbage/waste recycled products to be souvenir
 - c. Beads embroidery
 - d. Rice basket
 - e. Entrepreneurship training

III. CONCLUSION

The majority of the key informant has already seen dugong and can differentiate dugong to dolphin. Nowadays dugong has not been hunted anymore. Some dugong hunter from Bogam Bay who were really active in hunting finally stopped after getting awareness and informed that it is against the law by administration officer from DKP West Kotawaringin. Even though if there was an accidental case of trapped dugong in death condition, the causality would be utilized as food in some survey locations. Bogam Bay Village has the community who are frequently encountered with dugong and even captured a dugong accidentally. This happened because the community fishing ground is in the same place as dugong and seagrass ecosystems. A week before the survey being conducted, a dugong accidentally caught in fishing nets and released back to the sea because it was still alive. In 2015, an accidental cased happened and the dugong was dead so the community consumed it with other community from Bogam Bay

Dugong and seagrass conservation and tourism being one of tourist attraction and tourism sector which the community really wants to improve as a highly potential income resource and support for conservation program. In Bogam Bay besides it

has been declared about 135 hectares area would be stated as protected and conservation areas as cooperation results between West Kotawaringin DKP and the community of Bogam Bay and Sungai Bakau, also being planned to be built a Monitoring Station in Gosong Beras Basah. To be a monitoring post by the community and also West Kotawaringin DKP.

IV. MANAGAMENT ADVICES

- Interventions need to be developed to reduce the number of bycatch case, either through fishing tools modifications (e.g: Ping tools installation which producing sounds which would make dugong stay away from the tools) and also there should be time and location arrangement while using set net. If on a location has been identified as an important habitat for dugong, it is necessary to arrange the type of tools, the location and the time to settle a fishing tools.
- It is important to do a refinement on the regulation for an environmentally friendly (dugong friendly) fishing tools utilization as fish trap and fishing rod. Perlu perbaikan regulasi terkait penggunaan alat tangkap yang ramah lingkungan (ramah Dugong) seperti bubu dan pancing. The catch can be lifted using 'Eco-labeling' mechanism.
- Necessity to declare a district/national aquatic preservation and conservation area to support public aspirations in regards of dugong and seagrass ecosystems protection.
- Necessity to develop tourism destination based on conservation involving every elements as the first step in public attendance in the improvement program..
- A better communication and coordination in every governmental offices from central, province, district, and village should be constructed as a synergy for DSCP.

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APPENDIX



FGD in Bogam Bay Village



FGD with community patriarch in Bogam Bay



FGD with housewives community and Interview in Bogam Bay Village



Interview process in Pulai Bay and in Sungai Bakau Villages



Interview process in Kubu Village



Interview conducted in Keraya Village

Monitoring Seagrass Ecosystem in West Kotawaringin

The water condition in West Kotawaringin influenced by the water flow from the mainland because there are a lot of river creeks along the coastline. However, even the water was cloudy, common residents oftentimes saw dugong. Therefore observation on seagrass structure community has been conducting by BPSPL Pontianak with Research Center for Oceanography-LIPI. Second observation had been done by DSCP team on Oktober 2016. Monitoring conducted in four locations of Gosong (Gs) Pasir, which are Gosong Beras Basah, Gosong Senggora Besar, Gosong Senggora Terendam and Gosong Sepagar.

Gosong Beras Basah, which is a part of Bogam Bay's territory formed a length landscaping area from North to the South. Seagrass monitoring being done on The West side of Gosong. On the other hand at Gosong Senggora clusters, seagrass structure monitoring had done in Gosong Senggora Besar which located in the middle of the cluster and in Gosong Senggora Terendam on the north side of the cluster. Location for monitoring in Gosong Senggora Besar was on the South side. This method applied to avoid repetition data collection from the previous observation which had been done (2015) on the North side. In Gosong Sepagar observation has been conducted in South side. Hereby the coordinate for every observation sites presented in Table 3.

Table 3. Geographical position of seagrass observation area in West Kotawaringin

Location	Geographical Position	
	Latitude (Lat)	Longitude (Long)
Gs. Beras Basah	03° 03' 11.82"	111° 33' 7.20"
Gs. Senggora Besar	03° 14' 01.21"	111° 41' 19.64"
Gs. Senggora Terendam	03° 12' 20.34"	111° 41' 48.67"
Gs. Sepagar	03° 07' 45.59"	111° 45' 41.61"

Environmental condition in monitoring site considered to be good and in sea water quality standard released based on KEPMEN-LH No.51 in 2004, except for salinity (Table 4). Salinity score in the aquatic region of West Kotawaringin

tend to be low influenced by the stream of fresh water from the rivers. Yet, the seagrass still be able to grow. On every sites, the dominant substrate formed from fine sand (Table 5). By this, it is strongly indicated the seagrass ecosystem is a feeding ground for dugong because it is easier to feed on seagrass with fine substrate.

Table 4. Water Quality Result around Observation Site in West Kotawaringin

Location	Temperature (°C)	Salinity (psu)	pH	DO (mg/L)	TDS (g/L)	Depth (cm)
Gs. Beras Basah	30,20 - 31,89	18,2 - 28,2	8,41 - 8,66	42,35 - 46,19	25,40 - 45,40	64 - 153
Gs. Senggora Besar	31,82 - 33,09	28,5 - 29,0	8,53 - 8,76	40,92 - 42,50	43,00 - 46,40	87 - 190
Gs. Senggora Terendam	31,30 - 31,80	26,7 - 28,7	8,51 - 8,57	41,81 - 43,62	45,90 - 46,60	76 - 223

Table 5. Percentage size of substrate particle on seagrass ecosystem

Location	Gravel (%) (4 - 8 mm)	Coarse Sand (%) (0,5 - 2 mm)	Fine Sand (%) (0,125 - 0,25 mm)	Mud (%) (residu - 0,65 mm)
Gs. Beras Basah	1.02	15.81	79.88	3.29
Gs. Senggora Besar	1.28	24.72	34.97	6.26
Gs. Senggora Terendam	9.09	7.71	81.83	1.37
Gs. Sepagar	0.96	15.18	79.01	4.86

There are ten species of seagrass which had been found in the monitoring location, there are *Cymodocea rotundata*, *Cymodocea serrulata*, *Enhalus acoroides*, *Halodule pinifolia*, *Halodule uninervis*, *Halophila decipiens*, *Halophila minor*, *Halophila ovalis*, *Syringodium isoetifolium*, serta *Thalassia hemprichii* (Table 6). Gosong Beras Basah has the most seagrass species up to 7 types.

Table 6. Species composition and seagrass distribution in West Kotawaringin*

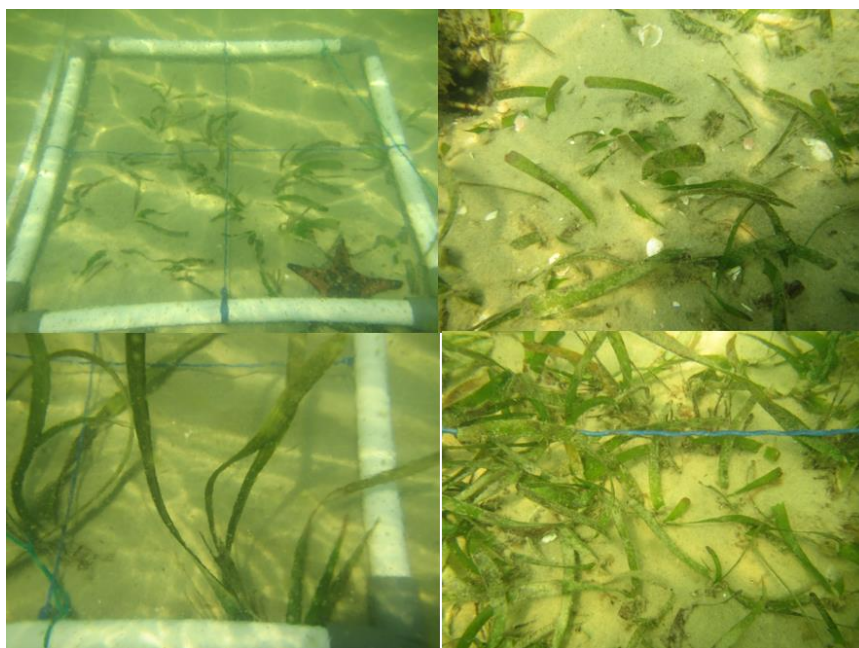
Species	Gs. Beras Basah	Gs. Senggora Besar	Gs. Senggora Terendam	Gs. Sepagar
<i>Cymodocea rotundata</i>	+	-	+	-
<i>Cymodocea serrulata</i>	-	+	+	+
<i>Enhalus acoroides</i>	+	-	-	-
<i>Halodule pinifolia</i>	-	-	+	+
<i>Halodule uninervis</i>	+	+	+	+
<i>Halophila decipiens</i>	+	-	-	-
<i>Halophila minor</i>	+	-	-	-
<i>Halophila ovalis</i>	+	+	+	-
<i>Syringodium isoetifolium</i>	-	+	+	+
<i>Thalassia hemprichii</i>	+	-	-	-

*Noted: (+) = found, (-) = not found

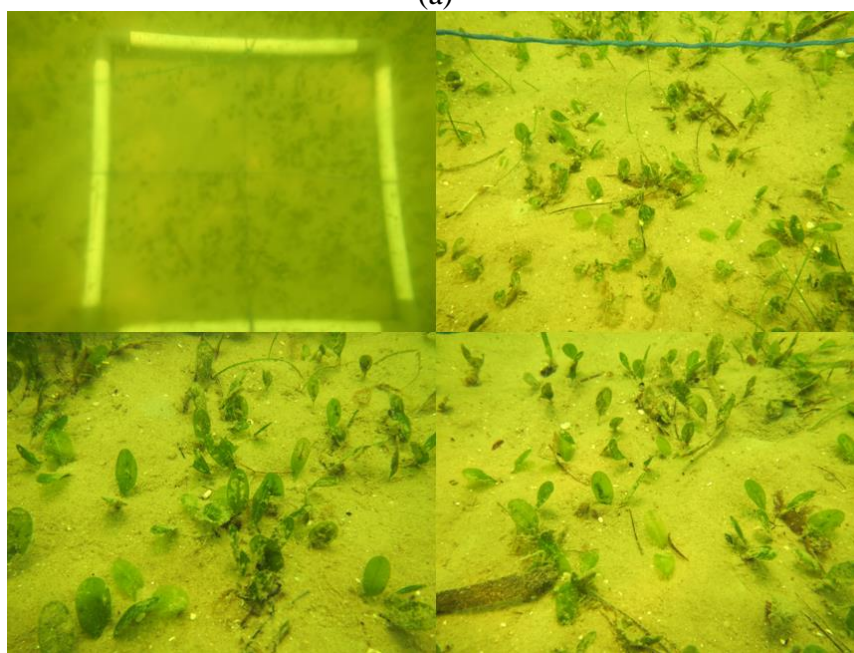
Seven species were found in every monitoring sites. For structure community monitoring, it started from the side which the site where the first seagrass being found (the closest part which is not submerged during low tide). Five seagrass species are found during the monitoring (Table 7). Percentage cover in the area is 35.58 ± 16.30 % and dominated by *Thalassia hemprichii* (Table 5). In general, seagrass which being found in this area tend to have smaller size. The ecosystem form seagrass commune with structure in approximate to ± 1 km distance from the side of Gosong (Waypoint 72). On that site, we could find varied growth of *Halodule uninervis*, *Halophila decipiens* and *Halophila ovalis* with percentage cover of 25 %. The condition is presented in Figure 22.

Table 7. Percentage cover of seagrass at monitoring locations in Kotawaringin Barat

Location	Seagrass Species	Percentage Cover (%)	
		Species	Average Point
Gs. Beras Basah	<i>Cymodocea rotundata</i>	11,25 \pm 0,00	35,58 \pm 16,30
	<i>Enhalus acoroides</i>	10,69 \pm 13,34	
	<i>Halophila decipiens</i>	1,25 \pm 0,00	
	<i>Halophila minor</i>	5,00 \pm 0,00	
	<i>Thalassia hemprichii</i>	32,06 \pm 16,67	
Gs. Senggora Besar	<i>Cymodocea serrulata</i>	8,70 \pm 8,29	26,42 \pm 16,05
	<i>Halodule uninervis</i>	9,25 \pm 6,51	
	<i>Halophila ovalis</i>	8,44 \pm 10,35	
	<i>Syringodium isoetifolium</i>	5,15 \pm 3,04	
Gs. Senggora Terendam	<i>Cymodocea rotundata</i>	6,06 \pm 2,75	18,83 \pm 9,62
	<i>Cymodocea serrulata</i>	5,35 \pm 2,55	
	<i>Halodule pinifolia</i>	8,50 \pm 2,12	
	<i>Halodule uninervis</i>	5,81 \pm 2,84	
	<i>Halophila ovalis</i>	6,88 \pm 0,88	
	<i>Syringodium isoetifolium</i>	8,08 \pm 2,24	
Gs. Sepagar	<i>Cymodocea serrulata</i>	6,56 \pm 2,58	18,86 \pm 14,57
	<i>Halodule pinifolia</i>	28,75 \pm 8,84	
	<i>Halodule uninervis</i>	13,44 \pm 14,20	
	<i>Syringodium isoetifolium</i>	16,25 \pm 0,0	



(a)



(b)

Figure 22. Ecosystem Condition of Seagrass in Gosong Beras Basah; side part of gosong (a) and Waypoint 72 (b)

Based on Table 6, Gosong Senggora Besar has four species of seagrass, which are *Cymodocea serrulata*, *Halodule uninervis*, *Halophila ovalis*, and *Syringodium isoetifolium*. Percentage vegetation cover score is $26,42 \pm 16,05$ % and dominated by *Halodule uninervis* (Table 7). Previous monitoring result on the North part of Gosong Senggora Besar recorded seven species of seagrass. As for

other species being found in Gosong Senggora Besar were *Enhalus acoroides*, *Cymodocea rotundata*, and *Thalassia hemprichii*. The landscape are not too long and the all area length is about 70 m. The condition is shown by Figure 23.

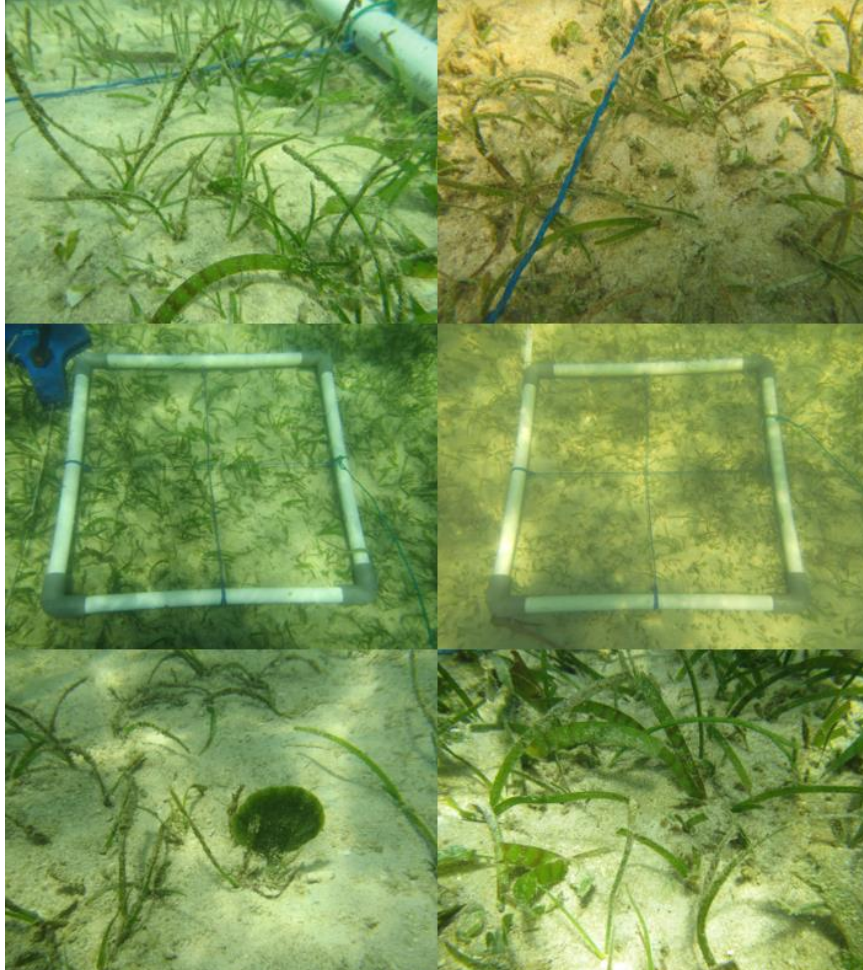


Figure 23. Seagrass Ecosystem Condition in Gosong Senggora Besar

Located on The North part of Gosong Senggora Cluster, Gosong Senggora Terendam often impassable by fishing ships which are going to be in the jetty or just to take a break in Gosong Senggora Besar. Named as Gosong Senggora Terendam because oftentimes being submerged during high tides or even low tides. The seagrass in this location growth in structure and group of seagrass called as *patch*. There are six species found in the area (Table 6). *Halodule pinifolia* is dominating the percentage vegetation cover in Gosong Senggora Terendam with average score of 18.83 ± 9.62 % (Table 7). Figure 24 below shows the ecosystem condition of the area.

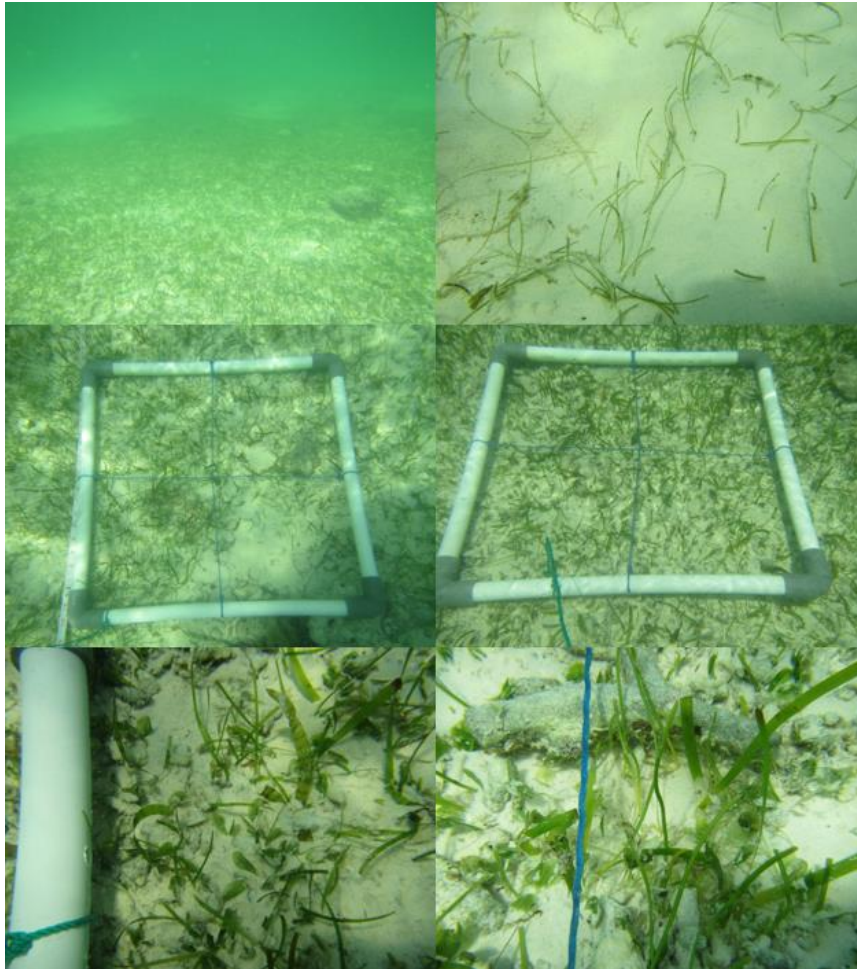


Figure 24. Seagrass ecosystem condition in Gosong Senggora Terendam

The last location being monitored in West Kotawaringin is Gosong Sepagar. Seagrass ecosystem in the area has four species of seagrass (Table 6). From the four species, *Halodule pinifolia* dominated the population in Gosong Sepagar with percentage cover average score is 18.86 ± 14.57 % (Table 7). The length of the area only about 100 m. On the point of 100 meter, some species of corals are dominating the base substrate on the seabed. A unique thing was visible is there are bivalvia attached to *Halodule sp.* The condition of seagrass ecosystems presence in Figure 25. In general, on every observation areas in West Kotawaringin is really potential as dugong's feeding ground areas according to seagrass species (Table 7) and type of substrate (Table 5) as the result from monitoring which had been conducted.

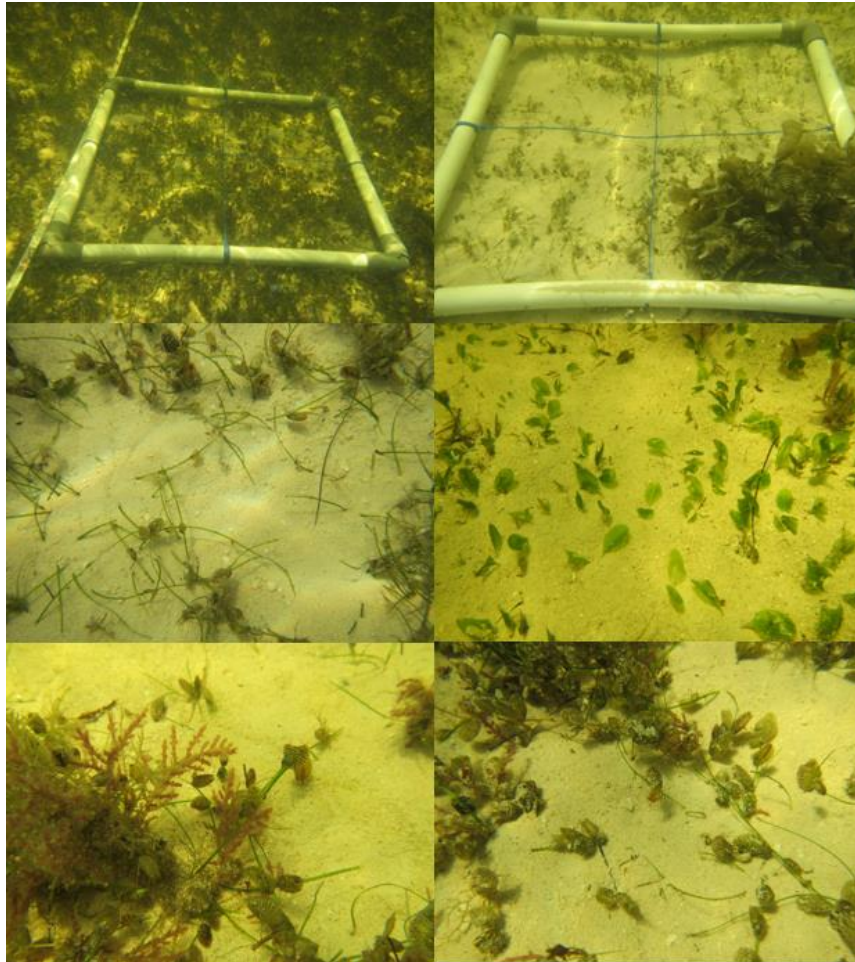


Figure 25. Seagrass Ecosystem Condition in Gosong Sepagar

Build upon the vegetation density score, *Thalassia hemprichii* in Gosong Beras Basah has the highest score of 12,988 individu/m² (Figure 5). Seagrass species as *Halodule uninervis*, *Halophila ovalis*, and *Thalassia hemprichii* at Gosong Senggora Terendam showed sizable percentage cover scores. On the other hand *Enhalus acoroides*, *Halophila decipiens* and *Halophila minor* in the area of Gosong Beras Basah has a low density score.

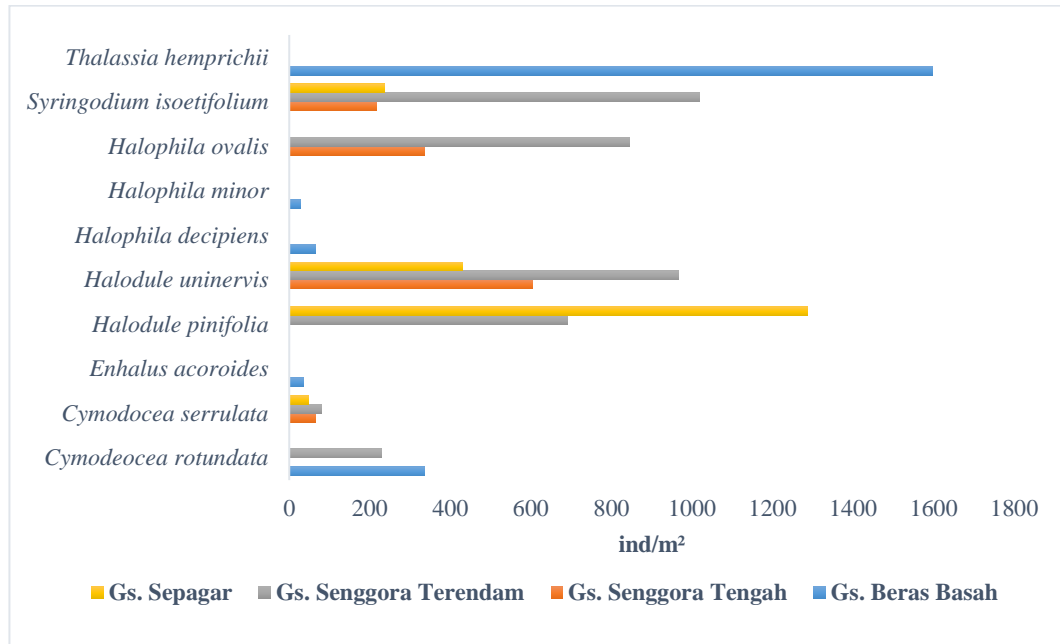


Figure 26. Density score of seagrass ecosystem in West Kotawaringin

Grazing activity has closely related to the amount of seagrass biomass. In consequence of that, dried seagrass biomass becomes one of the indicator in structure monitoring of seagrass community areas. The weight of dried seagrass total biomass is about 5.52 ± 7.06 to 956.32 ± 562.37 gBK/m² (Table 8). Seagrass species which has the highest total dried biomass in Gosong Beras Basah as well as the highest score measurement compared to all other monitoring sites is *Thalassia hemprichii* with total biomass up to 956.32 ± 562.37 gBK/m². In Gosong Beras Basah, seagrass species as *Halophila decipiens* has the lowest dried total biomass which was about the score of 194.71 ± 0.00 gBK/m².

Table 8. Average Biomass Weight of Dried Seagrass kering lamun

Location	Species	Lower Biomass (gBK/m ²)	Upper Biomass (gBK/m ²)	Total Biomass (gBK/m ²)
Gs. Beras Basah	<i>Enhalus acoroides</i>	170.04 ± 70.20	72.66 ± 64.66	242.69 ± 114.58
	<i>Halophila decipiens</i>	-	-	194.71 ± 0.00
	<i>Thalassia hemprichii</i>	839.79 ± 485.35	116.54 ± 97.11	956.32 ± 562.37
Gs. Senggora Besar	<i>Cymodocea serrulata</i>	22.27 ± 19.60	4.98 ± 5.75	27.27 ± 24.89
	<i>Halodule uninervis</i>	21.46 ± 14.26	7.81 ± 4.77	29.27 ± 16.45
	<i>Halophila ovalis</i>	-	-	5.52 ± 7.06
	<i>Syringodium isoetifolium</i>	25.80 ± 6.30	6.44 ± 3.15	32.24 ± 9.45
Gs. Senggora Terendam	<i>Cymodocea rotundata</i>	8.65 ± 7.69	4.79 ± 2.09	13.44 ± 9.71
	<i>Cymodocea serrulata</i>	16.09 ± 0.00	10.51 ± 0.00	26.60 ± 0.00
	<i>Halodule pinifolia</i>	9.85 ± 0.00	2.46 ± 0.00	12.31 ± 0.00
	<i>Halodule uninervis</i>	32.27 ± 8.27	4.85 ± 2.81	37.12 ± 5.48
	<i>Halophila ovalis</i>	-	-	12.36 ± 13.03
	<i>Syringodium isoetifolium</i>	42.74 ± 9.31	18.95 ± 0.07	61.69 ± 9.38
	<i>Thalassia hemprichii</i>	4.52 ± 0.00	14.15 ± 0.00	18.67 ± 0.00
Gs. Sepagar	<i>Halodule uninervis</i>	19.90 ± 13.79	6.67 ± 4.04	26.58 ± 12.51
	<i>Syringodium isoetifolium</i>	24.27 ± 0.00	9.55 ± 0.00	33.82 ± 0.00

Total dried biomass from *Halophila ovalis* seagrass in Gosong Senggora Besar is the lowest biomass seagrass biomass from the entire monitoring area in West Kotawaringin, which is only 5.52 ± 7.06 gBK/m². While the highest dried biomass measurement shown by *Syringodium isoetifolium* with weight score up to 32.24 ± 9.45 gBK/m². As well as the highest biomass measurement in Gosong Senggora Terendam is from the same seagrass species with score up to 61.69 ± 9.38 gBK/m². Seagrass species with the lowest biomass score in Gosong Senggora Terendam is *Halodule pinifolia* with measurement of 12.31 ± 0.00 gBK/m². During observation in Gosong Sepagar, only two species of seagrass available which are *Halodule uninervis* and *Syringodium isoetifolium*. Both species has total dried biomass measurement in the amount of 26.58 ± 12.51 and 33.82 ± 0.00 gBK/m².

Dried biomass measurement also performed on the feeding trail in Gosong Beras Basah as the most often sites where dugong has been sighted. Three types of seagrass recoded along the feeding trail and presented in Table 9. The top part of biomass (from seagrass leaves and sheath) were found in and outside the feeding trails. The total biomass measurement from *Halophila ovalis* species has the highest amount of scored compared to other *Halodule* species founded in the feeding trail, whilst *Halodule pinifolia* has the highest dried biomass measurement in the feeding trail with the amount of 18.22 ± 11.50 gBK/m². Based on Table 8 and 9, the part of seagrass which potentially being eaten by the dugong is the lower part of the seagrass (rhizome and roots part).

Table 9. Average measurement of dried biomass found in feeding trail all along in seagrass ecosystem in Gosong Beras Basah

Location	Species	Position	Lower part Biomass (gBK/m ²)	Upper part Biomass (gBK/m ²)	Total Biomass (gBK/m ²)
Gs. Beras Basah	<i>Halodule pinifolia</i>	Inside	-	18.22 ± 11.50	18.22 ± 11.50
		Outside	$10,60 \pm 18,42$	22.79 ± 14.50	33.39 ± 9.34
	<i>Halodule uninervis</i>	Inside	-	13.47 ± 0.00	13.47 ± 0.00
		Outside	$2,83 \pm 2,52$	13.82 ± 16.46	16.65 ± 18.08
	<i>Halophila ovalis</i>	Inside	-	-	-
		Outside	-	-	45.30 ± 16.16

The ecosystem condition of the seagrass field is analyzed based on the number of species found, density and percentage cover of seagrass vegetation and from biomass measurement compiled by Wouthuyzen (2009). Based on those criteria's, Gosong Beras Basah is in good condition, while Gosong Senggora Besar and Senggora Terendam's seagrass

ecosystems have moderate condition (Table 10). However, the ecosystem in Gosong Sepagar is really poor.

Table 10. Seagrass ecosystem condition in West Kotawaringin District

Location	Score				Seagrass Condition
	Numbers of Species	Coverage	Biomass	Total	
Gs. Beras Basah	3	2	4	9	Good
Gs. Senggora Besar	2	2	1	5	Moderate
Gs. Senggora Terendam	3	1	1	5	Moderate
Gs. Sepagar	2	1	1	4	Poor

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Dugong Monitoring in West Kotawaringin

Visual Survey

Visual observation has been done using drone, binoculars and diving equipment. Activity of the visual survey was focused on South coastal area of Bogam Bay Village, which is Gosong Beras Basah. Observation was being held for 5 days (11-15 of October 2016), dugong had sighted on the first day, Tuesday, October 11th 2016 evening at 23.17 GMT+7 (03^o05.361 S , 111^o34.000 E) and Wednesday, October 13th 2016 morning at 09.47 GMT+7 (03^o05.476 S , 111^o34.351 E), Dugong also sighted swam around with sea turtle. Dugong in the area is really sensitive, during observation it was very difficult to take documentation of dugong went to the surface area to take a breath, because the timing only needs about 2 seconds and the cloudy water made it more difficult to be documented.



Figure 26. Sea turtle in the seagrass ecosystems, dugong's feeding ground

Feeding Trail Survey

Observation on Dugong's feeding trail had been done for 5 days (October 11th-15th 2016). Feeding trails being sighted on the East and West of Gosong Beras Basah (03^o04.955 S , 111^o34.272 E) and Gosong Senggora, the condition when observed was new and just got left by the dugong, based upon how clean the feeding trail and there was not any pioneer vegetation grown on site. The location is really close with the previous location where a dugong had been sighted. This confirmed that the feeding trail was new and just recently visited by the dugong for feeding activity.

Based on feeding trail analysis, the average length measurement is 1.5 – 7.6 m, with width of 9 - 22 cm and depth of 2 - 6 cm (Figure 27). Founded feeding trail formed a long and intricate trail, this indicated that the dugong feeds with grazing method, Jejak makan yang ditemukan ini membentuk jejak memanjang dan berliku, kondisi ini menginformasikan bahwa dugong yang ada di Desa Jelaje makan dengan cara *grazing*, a crawling position and using both of pectoral fins to prop the bodyweight and plucking on the seagrass to the roots, the activity resulting a huge bare spot on the seabed known as *feeding trail*.

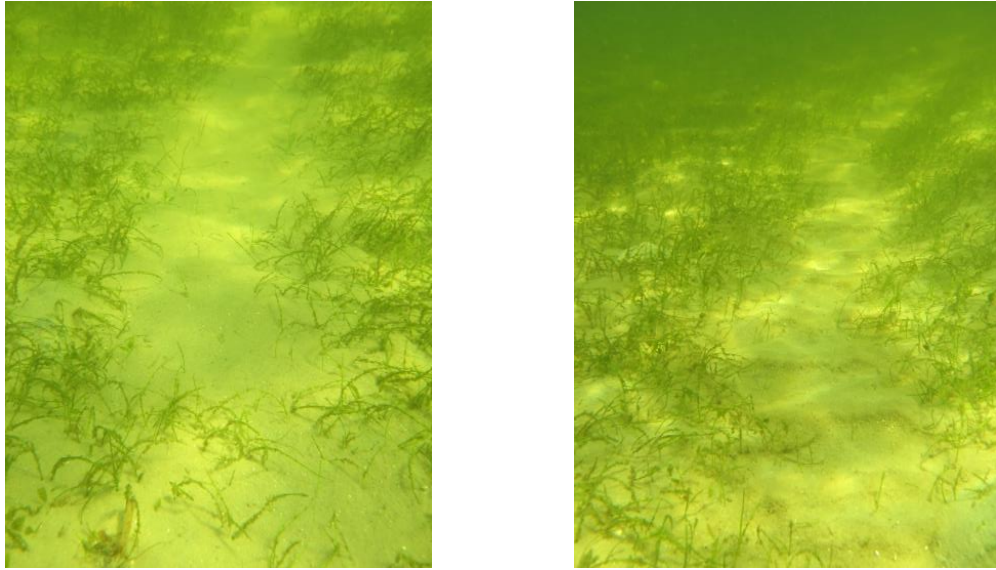


Figure 27. Some feeding trail founded in Gosong Beras Basah, Bogam Bay

On the feeding trail which has been passed by dugong in this area, could be identified with seagrass species as *Halodule uninervis*, *Cymodocea serrulata*, *Halophila ovalis* dan *Thalassia hemprichii* (Figure 28).



Figure 28. Seagrass Condition in Gosong Beras Basah, Bogam Bay

Figured the feeding trail and seagrass species which grown around the feeding trail, dugong in Gosong Beras Basah has preferences to feed on smaller, fibrous or cellulosed seagrass. Dugong preferred smooth and easier to digest type of seagrass but has high nutrient density as like *Halodule uninervis* and *Cymodocea serrulata*, this is suitable with Preen (1995) statement as mentioned one of dugong's favorite type of seagrass are *Halophila* sp, *Cymodocea* sp. and *Halodule* sp.



Figure 29. Photograph of Dugong's feeding area in Gosong Beras Basah, Bogam Bay

Based on identified feeding train in Gosong Beras Basah, indicated that seagrass ecosystems there is a feeding ground area for *Dugong dugon* (Figure 29).

REFERENCES

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

Dugong Monitoring Attachment Result in West Kotawaringin

Date	No	Method	Time	WP	Latitude	Longitude	Velocity	Finding	Environmental Condition	Information
			(a-b)	(c-d)					#Individual, Behavior	
11-Okt-16	1	Drone	9:10-9:30	Beras Basah	3° 5' 6.310" S	111° 34' 17.047" E	v= 3m/s; h= 30 m	-	Gosong Pasir	
	2	Manta tow	11:00-11:30	72	3° 3' 16.664" S	111° 33' 0.428" E		Feeding Area	Seagrass field, fine sanded, cloudy water	
				73	3° 3' 20.351" S	111° 32' 57.242" E		Feeding Trail		
	3	Hydrophone	23:17-23:32	75	3° 5' 6.310" S	111° 34' 17.047" E	h=-3m	None	Strong current	Heard the sound of Dugong's breath
	1	Drone	8:58-9:15	76	3° 3' 20.531" S	111° 32' 57.059" E	v= 3m/s; h= 30 m		Seagrass field, clear sight	Manta tow 11/10/16, WP 72-73
	2	Hydrophone	8:53-9:05				h=-3m	None		
	3	Visual	8:50-9:15							
	4	Visual		77	3° 6' 4.713" S	111° 33' 29.610" E		Feeding Trail	Seagrass field, clear sight	
	5	Visual	9:47	78	3° 5' 28.903" S	111° 33' 58.586" E		Dugong and Sea turtle	Seagrass field, clear sight	Head Village Officer's recommendation to do night monitoring , WP 75
	6	Drone	09:50-09:55	78	3° 5' 28.903" S	111° 33' 58.586" E	v= 3m/s; h= 30 m	Feeding Trail		

	7	Visual	10:00-10:20	80	3° 5' 1.864" S	111° 34' 8.407" E		Dugong	Seagrass field, clear sight	
	9	Drone	10:07-10:20				v= 3m/s; h= 30 m			
	10	Hydrophone	10:10-10:20				h=-3m	None		
	11	Manta tow	10:51	81	3° 4' 50.117" S	111° 34' 14.344" E	2 km/jam	Feeding Area	Seagrass field, clear sight	
	12	Manta tow	10:52	82	3° 4' 50.217" S	111° 34' 15.316" E	2 km/jam	Feeding Area	Seagrass field, clear sight	
	13	Manta tow	10:55	85	3° 4' 53.083" S	111° 34' 14.999" E	3,8 km/jam	Feeding Area	Seagrass field, clear sight	
	14	Manta tow	10:56	86	3° 4' 54.494" S	111° 34' 14.613" E	3,8 km/jam	Feeding Area	Seagrass field, clear sight	
	15	Manta tow	10:58	87	3° 4' 57.320" S	111° 34' 13.660" E	3,8 km/jam	Feeding Area	Seagrass field, clear sight	
	16	Visual	11:21	88	3° 4' 53.303" S	111° 34' 10.582" E		Feeding Trail	Seagrass field, clear sight	

	17	Visual	11:27	89	3° 5' 7.206" S	111° 34' 14.210" E		Feeding trail	Seagrass field, clear sight	
	18	Visual	11:30 - 12:00	90	3° 5' 28.561" S	111° 34' 21.025" E	v= 3m/s; h= 30 m	Dugong and Sea turtle	Cloudy water	
	19	Drone	11:40-12:00					Sea turtle		
	20	Hydrophone	11:45-12:00					h=-3m		
13/10/2016	1	Hydrophone	8:10-8:27	88	3° 4' 53.303" S	111° 34' 10.582" E		None	Cloudy, low exposure	
	2	Visual						Sea turtle		
	3	Drone	10:55-11:15	91	3° 5' 19.442" S	111° 34' 6.831" E	v= 3m/s; h= 30 m	Sea turtle	Clear	
	4	Visual	10:55-11:17							
	5	Visual	11:31	91	3° 5' 19.442" S	111° 34' 6.831" E		Sea turtle	Clear	
	6			92	3° 5' 32.039" S	111° 33' 58.288" E		Sea turtle	Clear	
	7			93 (batu babi)	3° 4' 58.123" S	111° 35' 10.212" E		Sea turtle	Clear	
	8			94	3° 5' 19.795" S	111° 34' 9.412" E		Sea turtle	Clear	
	9	Visual	14:30-15:00	88	3° 4' 53.303" S	111° 34' 10.582" E			Couldy, streams	
14/10/2016	1	Visual	7:30-8:21	93 (batu babi)	3° 4' 58.123" S	111° 35' 10.212" E	v= 3m/s; h= 30 m		Wave, a lot of noise	
	2	Hydrophone	8:08-				h=-3m	Suspect		

			8:18							
	3	Drone	8:01-8:21						Sea turtle	
	4	Drone	8:43-8:53	88	3° 4' 53.303" S	111° 34' 10.582" E	v= 3m/s; h= 30 m	Sea turtle	Cloudy,toward low tide	
	5		9:06-9:27					Barracuda		
	6	Hydrophone	9:30-9:35				h=-3m	none		
	7	Visual	8:43-9:35							
15/10/2016	1	Drone		98	3° 5' 33.968" S	111° 33' 54.522" E	v= 3m/s; h= 30 m		Cloudy,toward low tide	
	2	Visual	11:24	98	3° 5' 33.968" S	111° 33' 54.522" E	v= 3m/s; h= 30 m	Sea turtle		
	3	Hydrophone	11:32-11:48	99	3° 5' 6.122" S	111° 34' 16.989" E	h=-3m	Suspect (07:20, 07:28, 10:08)		