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Physical Condition of Spawning Habitat for Olive Ridley Turtle (Lepidochelys Olivacea) In Coastal Waters of Polewali Mandar Regency, Makassar Strait

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ABSTRACT

The olive ridley turtle is one of the potential marine resources that spawn in the MempiePolewaliMandar Coast, Makassar Strait. The increase in the number of turtle hatchlings spawning on the Mampie coast is not accompanied by an increase in the success of the turtle eggs hatching which tends to decrease, this is predicted due to habitat degradation. This study aims to identify the characteristics of spawning habitats and to assess the population of the sea turtles in the Mampie Coast.The research was conducted from February to March 2019 at 2 observation and measurement stations, namelyMampie Cape and Mampie Beach. Habitat conditions as observed ecological factors were the length and width of the beach with respect to turtle habitat, beach slope, sand fraction, sand water content, sand temperature, coastal vegetation, threats and disturbance factors in the Mampie Coastal Area, turtle frequency and egg hatching success rate. The turtle spawning habitat on the Mampie Coast has the characteristics of a beach length of 6 km, a beach width from the lowest low tide coastline to supra littoral 50.20 m - 77.35 m, including the category of a gentle beach, with a slope ranging from 4.00° - 8 ,11°, the sand fraction is dominated by fine sand (0.125 mm – 0.25 mm), the water content of the sand pit where the eggs are laid is in the normal range, which is between 6.45% - 10.15%, the temperature of the sand is between 27.4°C – 34.6°C. The plant vegetation in the two observation sites has different species compositions, namely: in the cape of Mampie there are *Spinifexlittoreus, Cyperusrotundus, Clerodendruminerme, Cocosnucifera, Ipomeapescaprae*. And on Mampie Beach there are *Spinifexlittoreus, Pandanustectorius, Terminaliacatappa, Morindacitrifolia*. Meanwhile, threats that affect the turtle spawning process in the Mampie Coast are wild animals such as monitor lizards (*Varanussalvator*), sand crabs (*Ocypodeceratophthalmus*), cats (*Feliscatusdomesticus*), dogs (*Canis lupus*), red ants (*Aechophyllasmaragdina*) and other disturbances such as fishing activities, tourists and the construction of embankments around the Mampie Coast.The ANOVA test showed that there was no significant difference in the frequency of turtle laying eggs and the success rate of hatching eggs between Mampie Cape and Mampie Beach.

Keywords: Olive ridley turtle, nesting habitat characteristics, Mampie Coast

1.INTRODUCTION

Mampie Coast is located in PolewaliMandar Regency which is one of the coastal areas of the Makassar Strait which has attractive natural resource potential to be developed in coastal and marine ecotourism activities. Administratively, PolewaliMandar Regency is under the regional government of West Sulawesi Province which

has an area of 2,022.30 km², a coastline length of 89.07 km and a water area of 869.21 km² (KKP Office, 2011). One of the potential natural resources in the Mampie Coast is the turtle. The Mampie Coast is a natural turtle spawning and distribution area. Turtle conservation is not only carried out on the Mampie Coast but throughout the PolewaliMandar Coast of West Sulawesi. Efforts to conserve turtles are carried out by monitoring turtle nests so that the threat to the turtle nesting process can be minimized. The conservation has been carried out by a community group of turtle friends since 2015.

In Indonesia, the protection of turtles (eggs, body parts, and/or their derivative products is regulated through the Circular of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 526 of 2015. There are three of the six species of turtles protected in Indonesia found on the coast of Manpie, namely: (*Lepidochelysolivacea*), green turtle (*Cheloniamydas*) and hawksbill (*Eretmochelysimbricata*). Preliminary data from the Friends of the Turtle Community shows that olive ridleyturtle is the only type of turtle that makes nesting nests on the Mampie Coast. This is an opportunity for the surrounding community to make efforts to conserve turtles in nature and can become a tourist attraction to bring in turtles tourists as a source of additional income for the community in the Mampie Coast. However, local people use turtles and their eggs for consumption and for accessories.

The sea turtle population in Indonesia tends to continue to decline, where the decline is mainly caused by human factors (taking turtle eggs, hunting turtles, degradation of turtle habitat and taking biological resources that are used as food for turtles) compared to natural factors and predators. The high threat to sea turtles has resulted in the status of sea turtles being designated as rare and internationally protected fauna. The tortoise is included in the red list of the International Union for Conservation of Nature in the Vulnerable category (IUCN, 2019).

Based on preliminary observations, turtle utilization activities carried out by the Mampie Coastal community during the spawning season have the potential to reduce turtle populations and habitat degradation. Therefore, there is a need for management to protect the sustainability of turtle species in nature. Efforts that can support the sustainability of turtles in the area are to collect data and analyze the distribution of the turtle population by observing the biophysical characteristics of the habitat, and factors that can threaten the existence of turtles, so that coastal and marine management policies for turtles in the Mampie Coast are accommodated.

2.PURPOSE AND OBJECTIVES

This study was intended to identify the characteristics of the turtle nesting habitat and study its population in the Mampie Coast. As the purpose of the research, it is hoped that it will become the basis for consideration in efforts to conserve sea turtles in the Mampie Coast, PolewaliMandar Regency. So that it can be a recommendation to support the increase in the number of turtle populations in nature by knowing the characteristics of the habitat in accordance with the ecosystem in the Mampie Coast.

3. RESEARCH METHODS

3.1.Time and Location

This research was conducted in two locations, namely TanjungMampie and Mampie Beach, located in Galesong Village, Wonomulyo District, PolewaliMandar Regency, West Sulawesi. This location is a turtle conservation center area on the Mampie Coast. The semi-natural nesting nests for the olive ridley turtles are built around the turtle house. The geographical position is at points S 03,45426° and E 119,27386°. The location of the turtle nesting habitat can be seen in Figure 1.

Fig 1: Map of Research Locations at Mampie Beach, PolewaliMandar Regency

The research is divided into three stages; first, in November 2019 field observations were carried out, the second stage was carried out in February 2020 by conducting interviews with the managers of the Turtle House and observing the characteristics of the turtle nesting habitat, and the third stage conducting nesting nest sediment analysis and data processing in March.

3.2. Materials and tools

The materials used are sand samples from TanjungMampie and Mampie Beach. The tools used in this research are: GPS (Global Positioning System) to determine the coordinates of the data collection location, roll meter to measure the width of the beach, Google earth to measure the length of the beach, a stick with a scale of 2 m, right-angled ruler and rapiah rope to measure the length of the beach. measuring the slope of the beach, writing instruments to record data, cameras for documentation, sample bags for storing sand samples, small shovels for taking sand samples, 50 cm ruler for measuring nest depth and Sieve net for classifying sand sizes.

3.3. Determination of Sampling Location

Determination of sampling locations was carried out at two different points based on the traces of turtle nests at the study site. The information was obtained by direct observation and based on information from the local community. The sampling locations were in TanjungMampie and Mampie Beach. Both locations are listed as nesting sites for the tortoise (Lepidochelysolivacea). Geographically, the two locations are in the position of S 3.440790°, E 119.274050° and S 3.454500°, E 119.274050°.

3.4.Parameters And Data Retrieval Method

The data used in this study are primary data (Table 1).

Table 1. Parameters and data collection methods

Collected data	Method
Beach physical condition	
- The length and width of the beach	- Measure the length of the beach withGoogle earth and the width of the beachwith the rollmeter
- Beach slope	- Measurement with a roll meter and a scale stick
- Sand fraction	-Using stratified filtering (Sieve Net) and sand fraction seen on the Wentworth scale (Wentworth,1992)
- Sand water content	-Heating/drying of sand samples
- Sand temperature	-Using a thermometer
Biological conditions of the beach	
-Vegetation	- Species identification (Guidelines for Recognizing Mangroves in Indonesia, Noor et al., 2012 and Guidelines for Coastal Forest Rehabilitation, Hanley et al., 2008)
- Types of turtles and other animals-	Identification of turtle species and other animals (Dermawan et al.,2009)

Table 2. Types of secondary data and data sources

Collected data	Data source
Aspects of the Olive Ridley Turtle Biology	
- Frequency of occurrence of hatching success rate	-Turtle Friends Community Group
- Turtle population for the last 3 years (2017 -2019)	-Turtle Friends Community Group

4. DATA ANALYSIS

Data analysis was carried out using 2-way and descriptive ANOVA (analysis of variance). This analysis is to compare the data on the frequency of occurrence of the mother turtle and the success rate of hatching eggs for the turtle eggs for the last 3 years (2017 - 2019) at different nesting locations in the Mampie Coast. Descriptive analysis in the form of explanations and descriptions of the results of the data obtained in the field. The data analyzed was in the form of data on the characteristics of the turtledove habitat in the Mampie Coast which is the research location.

5. RESULTS

5.1. The Physical Character of The Beach

5.1.1 The length and width of the beach

The lengths of the beaches of Mampie cape and Mampie beaches are presented in Figure 2 and Figure 3. Meanwhile, the width of the beach on the Mampie Cape ranges from 15.00 m – 45.45 m. And the width of the beach at the measurement points at Mampie Cape and Mampie Beach is presented in Figure 4. The length of the beach and headland of Mampie is different, which is between 4.30 km and 1.70 km.

Fig 2: Map of the length of the MampieCape

Fig 3: Map of the long of the Mampie Beach

Based on observations, it turns out that Mampie beach has a beach width that is suitable as a spawning and hatching habitat for turtle eggs. The width of the beach where turtle nesting is classified as the preferred width for turtles is in the range of 30 m - 80 m (Nuitja, 1992).

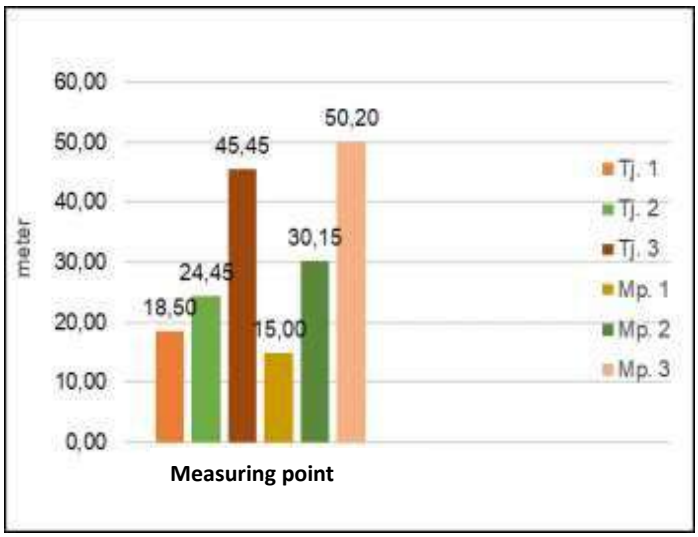

Fig 4: The width of the beach and Mampie Cape

The width of the beach where spawning belongs to the turtle's preferred width is in the range of 30 m - 80 m (Nuitja, 1992). This is relatively the same in the wide range of Mampie Cape and Mampie beaches which turtles prefer to make nests.

5.1.2 The slope of the beach

The slope of the Mampie Coast ranges from 4.00° - 8.11° with an average coastal slope of 7°, this value indicates that the Mampie Coast is included in the category of sloping beaches.

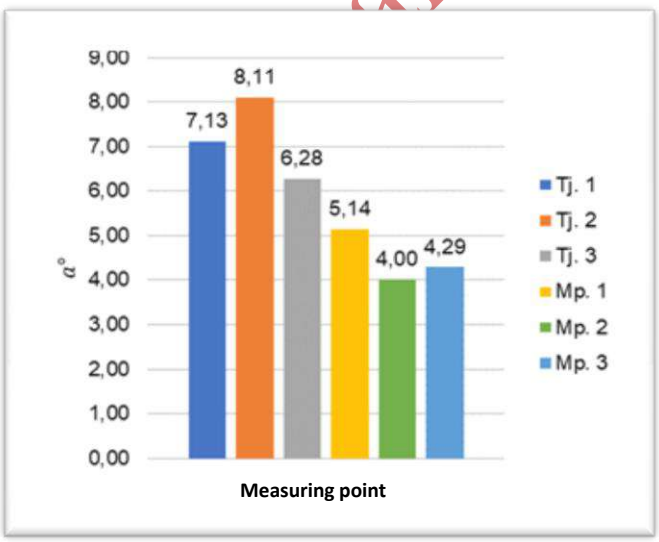

Fig 5: The slope of the coast on the MampieBeach

A number of studies have shown that sea turtles prefer sloping beach conditions with a maximum beach slope of 30° (Reichart, 1993).

5.1.3 Sand fraction

The sediment substrate fraction in the turtle spawning habitat of Mampie Beach is dominated by fine sand. The sand substrate fraction at the Mampie Cape research station and Mampie Beach is presented in Figure 6.

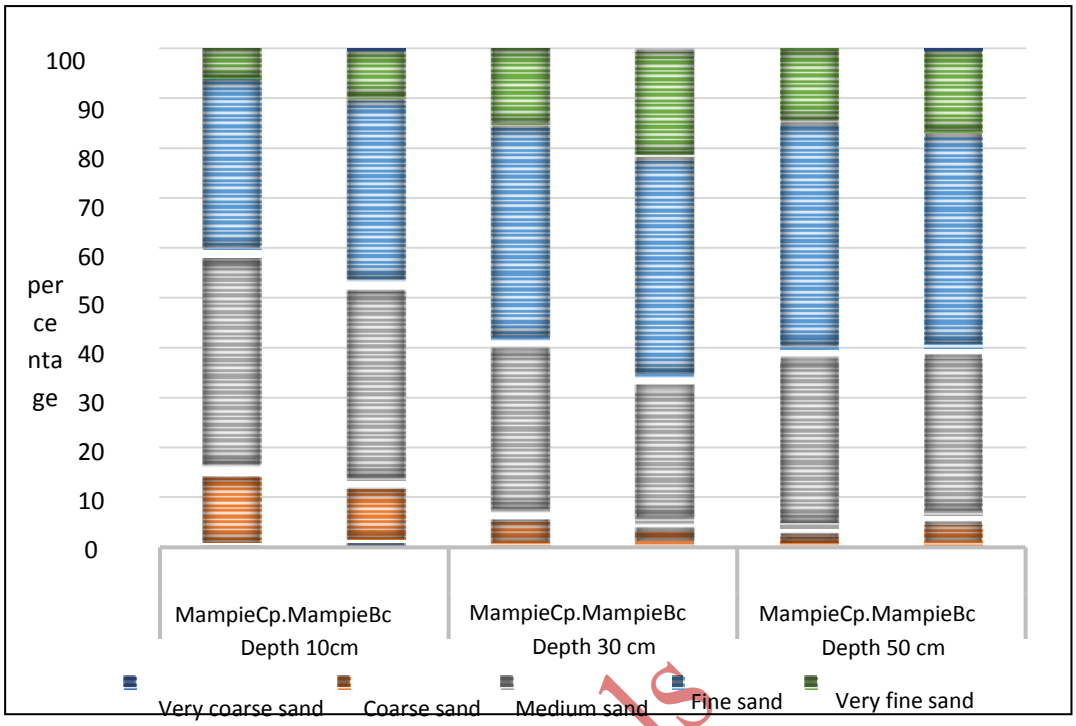

Fig 6: Sand substrate fraction in the spawning habitat of Mampie Cape and Mampie Beach

5.1.4 Sand moisture content

The water content of the sand in Mampie Cape and the water content of the semi-natural nest sand in the Mampie Beach at different depths is presented in Figure 21.

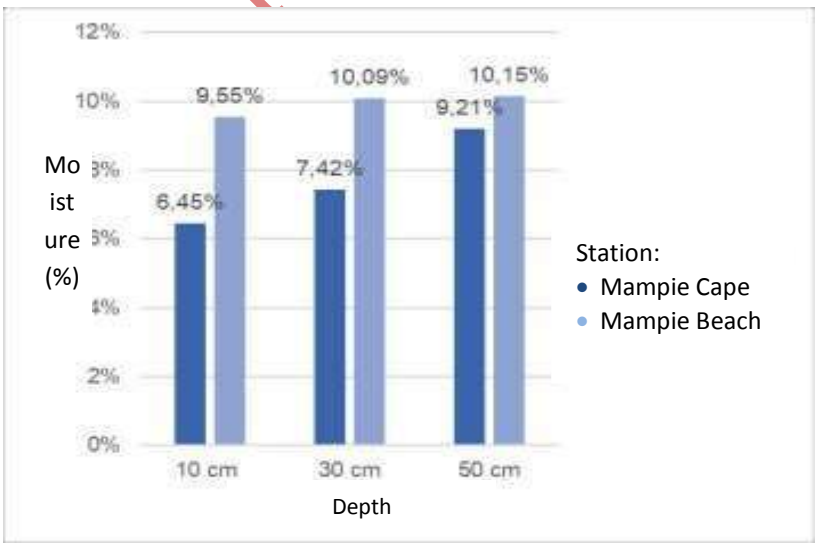

Fig 7: Moisture content of sand by depth

5.1.5 Sand temperature

The sand temperature at Mampie Cape and the incubation temperature of semi-natural nests at Mampie Beach at three measurement times with different depths are presented in Figure 22 and Figure 23 below.

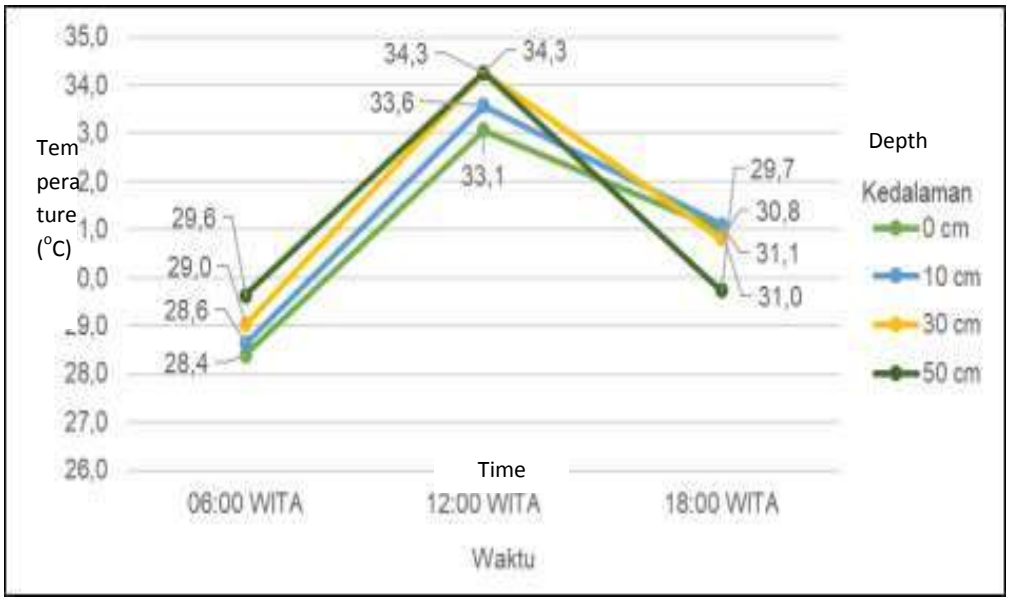

Fig 8: Graph of sand temperature at Mampie Cape

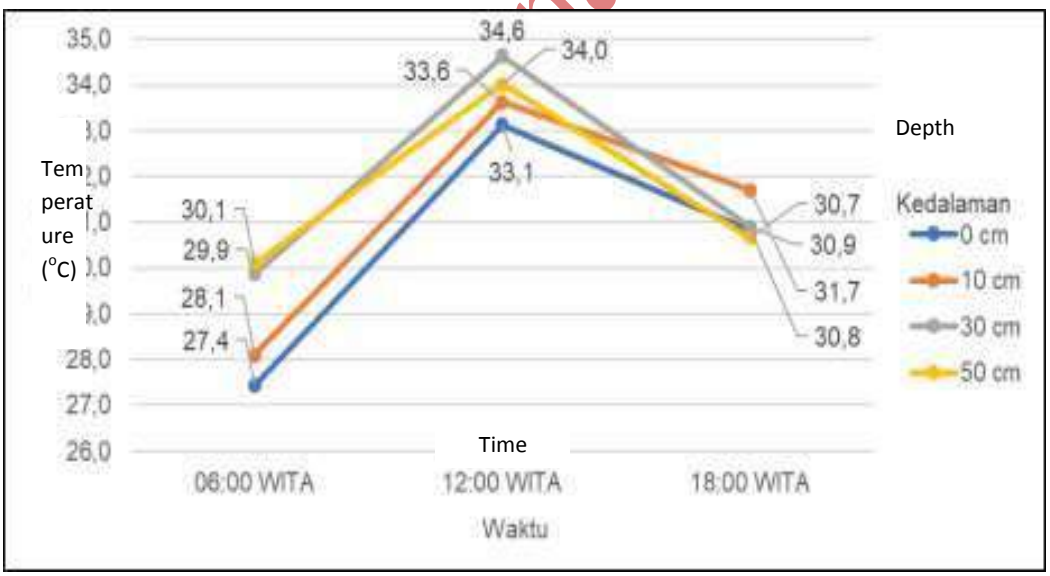

Fig 9: Graph of incubation temperature of the semi-natural nest of Mampie Beach

5.1.6 Beach vegetation

The types of coastal vegetation in TanjungMampie and Mampie Beach have different compositions of vegetation types. The vegetation can be seen in Table 4.

Table 4. Types of coastal vegetation at TanjungMampie and Mampie Beach (Guide Introduction of Mangroves in Indonesia; Noor et al., 2012.

Local Name	Latin name	Description	Formation
		Mampie Cape	
Rumputduri	Spinifexlittoreus	Bottom plant	Pes-caprae
RumputTeki	Cyperusrotundus	Bottom plant	Pes-caprae
Melatilaut	Clerodendruminerme	Pole	Barringtonia
Kelapa	Cocosnucifera	Tree	Barringtonia
		Mampie Beach	
Tapakkuda	Ipomeapes-caprae	Bottom plant	Pes-caprae
Rumputduri	Spinifexlittoreus	Bottom plant	Pes-caprae
Kelapa	Cocosnucifera	Tree	Barringtonia
Pandan	Pandanustectorius	Lush	Barringtonia
Ketapang	Terminaliacatappa	Tree	Barringtonia
Mengkudu	Morindacitrifolia	Pole	Barringtonia

5.1.7 Threats and disturbance factors on the Mampie Coast

Threats and disturbance factors around the Mampie Coastal nesting area in the form of wildlife and activities carried out by the community around the turtle nesting habitat. The types of wildlife found on the Mampie Coast are monitor lizards (Varanussalvator), sand crabs (Ocypodeceratophthalmus), cats (Feliscatusdomesticus), dogs (Canis lupus) and red ants (Aechophyllasmaragdina). Community activities that pose a threat and can disrupt nesting habitats are presented in Figure 10.

a

Fig 10: a) Seaweed cultivation in Mampie Cape, and b) Embankment construction on the MampieBeach

5.2 Olive Ridley Turtle Population

5.2.1 Types of turtles

There were two types of turtles found on the Mampie Coast during the study, namely the green turtle (Choloniamydas) and the olive ridley turtle (Lepidochelysolivacea). The types of turtles found are presented in Figure 11.

Fig 11:a) Green turtle (Cheloniamydas) at the Mampie Beach Turtle House, and b) The nesting process of the tortoiseshell (Lepidochelysolivacea) at Mampie Beach(Yusri, 2019)

5.2.2 Frequency of appearance of mother turtles

The frequency of occurrence of mother turtles for the last 3 years (2016 - 2018) on the Mampie Coast at the Mampie Cape research station and Mampie Beach is presented in Figure 12.

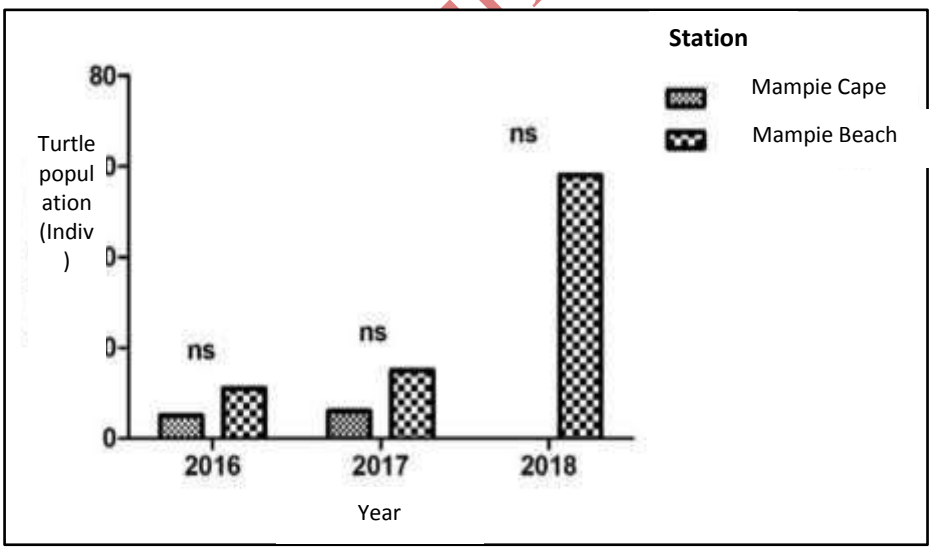

Fig 12: Population distribution of nesting turtles on the Mampie Coast

5.2.3 The success rate of hatching eggs

The success rate of hatching of turtle eggs for the last 3 years (2016 - 2018) on the Mampie Coast at theMampie Cape research station and Mampie Beach is presented in Figure 13.

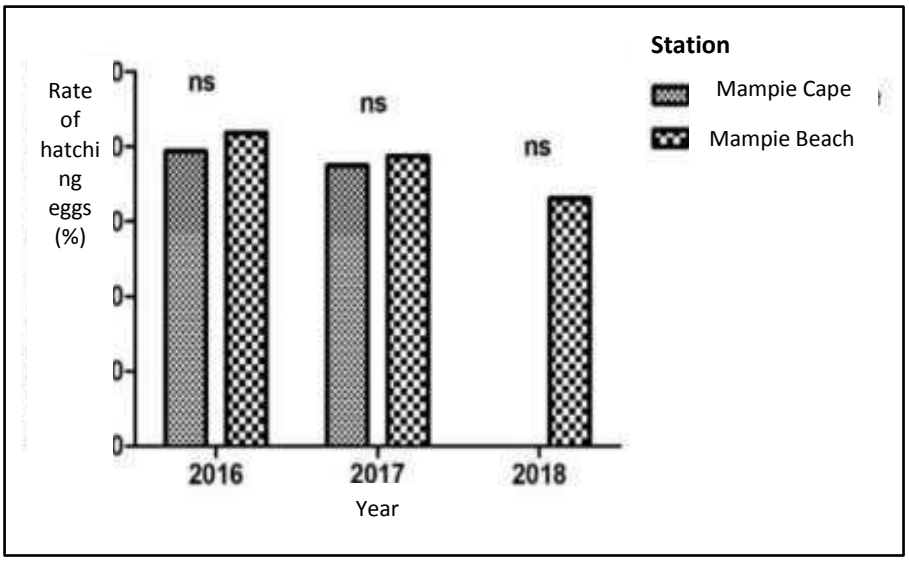

Fig 13: The success rate of hatching eggs of the olive ridley turtle in 2016 – 2018

6. DISCUSSION

6.1 Beach Biophysics

6.1.1The length and width of the beach

The width of the turtle nesting beach which belongs to the preferred width of turtles is in the range of 30 m - 80 m (Nuitja, 1992). So that the range of the beach width of Mampie Cape and Mampie Beach belongs to the width of the beach that turtles prefer to make nests. Based on the results of interviews with the manager of the Turtle House on the Mampie Coast and direct observations inthe field by looking at the traces of turtle nesting nests, the average turtle nesting nests were found in the Mp 2 and Mp 3 substations. Setiawan et al., (2018) stated that the width of the beach correlated well with the area available for nesting turtles.

6.1.2 The slope of the beach

The slope of the beach is very influential on the activity of turtles to land towards the beach. On the Mampie Coast, apart from nesting activities, turtles are also often found bathing or playing in the sand. The coastal slope of the Mampie Coast ranges from 4.00° - 8.11° with an average coastal slope of 7°, this value indicates that the Mampie Coast is included in the category of sloping beaches. Manalu (2010) states that the beach which is classified as sloping ranges from 2° - 6°. A number of studies have shown that sea turtles prefer sloping beach conditions with a maximum beach slope of 30° (Nuitja, 1992).

The slope of the beach at Mampie Cape and Mampie Beach is included in the sloping category and is favored by turtles for landing. Ridwan et al. (2017) stated that the slope of the coast is an important factor in the selection of nesting sites because it is reproductively advantageous. Beaches with an ideal slope can increase the chances of successful hatchlings. Beaches with sloping slopes have seawater intrusion far enough so that nests can be avoided from increased water content which can trigger egg decay.

6.1.3 Sand fraction

Sand is a medium for laying turtle eggs. Turtles look for parts of the sand surface that match their instincts to make nests, not all types of sand are used to make nesting nests. According to Dermawan et al., (2009), the olive ridley turtle has the characteristics of a nesting habitat consisting of black sand. The sand found on the Mampie Coast is black. This can be seen from the sand samples taken in the field. Sand texture is related to the level of ease in digging the nest. The turtles generally prefer broad and sloping beaches and are located at the top of the beach or above the highest tide line for their nesting sites, with a sediment composition of not less than 90% in

the form of sand and the rest is silt or clay, with a diameter of fine sand grains and moderate (Nuitja, 1992). Different nest depths did not show much different results on the success rate of spawning.

6.1.4 Sand moisture

The water content in the sand is an important factor in the growth of embryos and hatching of eggs. The more developing the embryo in the egg, the greater the absorption of water by the egg, so the diameter of the egg will increase. Dry sand will absorb the water content of the eggs because the salt content of the sand is higher. As a result, the embryo in the egg will not develop and die (Darmawan et al., 2009). The same thing was conveyed by the Alam Lestari Foundation (2000) that the absorption of water by sand is not good for the development of egg embryos. Meanwhile, too high a water content will be a problem in hatching eggs.

The results obtained from observations at a depth of 10, 30, and 50 cm at Station 1 and Station 2 are presented in Figure 20. The measurement of the water content of the sand in Mampie Cape ranges from 6.45% - 9.21% with an average of 7.70 %. Meanwhile, the water content in Mampie Beach ranges from 9.55% - 10.15% with an average of 9.93%. Based on Figure 6. The water content at Mampie Beach is higher than the water content atMampie Cape.

The percentage of water content of sand in the Mampie Coast is higher than the percentage of water content in the Babel Hatchlings Breeding, Sungailiat, Bangka Regency with water content ranging from 3.05% - 4.55%. This is because the location of the incubation site and the coastal topography is close to the land area, which allows far uptake of incoming seawater (Maulana et al., 2017). The water content of sand in the Mampie Coast is in the normal range. Based on the opinion of Limpus et al., (1995), eggs incubated in sand with a percentage of water content of 3% - 12% will experience normal embryo development. So it can be concluded that the water content of the sand in the Mampie Coast is suitable as a turtle nesting place.

6.1.5 Sand temperature

Temperature fluctuations occurred at a depth of 15 cm, so that at a nest depth of 10 and 20 cm the heating experienced by the eggs was higher which resulted in the embryonic process taking place more quickly (Nuitja, 1992). The temperature around the nest affects the sex percentage of hatchlings that will be born. If the incubation temperature is 24°C or less, 100% of the hatchlings born are male, while if the incubation temperature is 32°C or more, then the female hatchlings will be born (Ernst, et al., 2009). The temperature of the sand is an important component for the hatching process of turtle eggs because it can cause the turtle eggs to not develop properly or die.

The range of sand temperatures in Mampie Cape and Mampie Beach is still within normal limits. The temperature required for embryonic growth to run properly is between 24-33 °C. The speed of embryo growth is influenced by the temperature of the sand in which the eggs are embedded (Djohan, T.S. 2004). However, at 12.00 Central Indonesian Time (CIT) there was a change in temperature which increased by about 3.2 °C. Changes in temperature can affect the growth of the length and weight of the turtle embryo (Septiadi, R., 2017). The condition of the nesting location that has trees will determine the amount of radiation received by the nest.

6.1.6 Beach vegetation

Identification of vegetation types is used to determine the composition of plant species in the turtle nesting coast. The composition of the vegetation on the Mampie Coast makes it easier to locate the nesting nests of the turtles by the traces left by the mother turtles from the beach to certain vegetation where the turtles deposit their eggs. The vegetation found in Mampie Cape consists of 4 species and Mampie Beach consists of 6 species. The vegetation found around the turtle nests can be seen in Table 4.Based on the results of research in the turtle nesting beach area Station 1.Mampie Cape is dominated by undergrowth for the type of thorn grass (Spinifexlittoreus). The results of interviews with the Turtle Friends Community showed that turtle nesting nests

were found under thorn grass around sea jasmine (Clerodendruminerme) and coconut (Cocosnucifera) vegetation. Other vegetation found in the turtle nesting beach area of Mampie Cape is teki grass (Cyperusrotundus). Septiadi, R., (2017) explained that some turtle nests were found under the cover of vegetation, because vegetation roots can bind sand grains and prevent sand collapse so that it will make it easier for turtles to dig and lay their eggs.

The vegetation found around the turtle nesting area at station 2. Mampie Beach is dominated by undergrowth for the type of horse tread (Ipomeapes-caprae). Other types of vegetation found on Mampie Beach are grass-thorn (Spinifexlittoreus), tree-level vegetation, namely coconut (Cocosnucifera), pandan (Pandanustectorius) and ketapang (Terminaliacatappa), as well as pole-level vegetation of noni (Morindacitrifolia). Nuitja (1992) stated that the tortoiseshell turtles tend to choose nesting sites that have vegetation in the form of pine trees and ketapan. Coastal vegetation, which is dominated by creeping katang-katang, sea pandanus, and waru are the preferred habitat for turtles as nesting sites. Traces of the turtle nesting nests in Mampie Cape and Mampie Beach are often found with vines such as thorn grass and horse treads.

6.1.7 Threats and disturbance factors on the Mampie Coast

The types of wildlife found around the Mampie Coastal nesting area are monitor lizards (Varanussalvator), sand crabs (Ocypodeceratophthalmus), cats (Feliscatusdomesticus), dogs (Canis lupus) and red ants (Aechophyllasmaragdina). This type of wildlife is reported to threaten the existence of turtle eggs. Based on field observations, most sand crabs are found around turtle nests. However, based on information from the community, the type of monitor lizard that most often damages turtle nests. The types of wild animals found are species that can still adapt to human existence.

Not only wild animals can threaten the existence of turtle nesting nests on the Mampie Coast. Based on direct observations in the field, other threats that are a concern in the Mampie Coast are coastal abrasion caused by high waves. The manager of the Turtle House in Mampie Coast said that the high waves that hit Mampie Coast reached 2 meters and caused damage to turtle nesting habitats such as the fall of coconut trees (Cocosnucifera) which sheltered the nesting nests and the dragging of the horse tread plant (Ipomeapes-caprae) which is often found on the coast of Mampie. turtle nesting nest. Mursalin et al, (2017) stated that vegetation acts as ashelter for turtles when laying eggs so that they can avoid predators. Another threat that can interfere with the existence of turtles in the Mampie Coastal Area is the construction of the embankment in the eastern part of Mampie Beach which is currently still ongoing. To overcome this problem, the manager of the Turtle House coordinates with stakeholders in the construction of the embankment so as to minimize the impact that will be caused by the construction of the embankment. In addition, it is often found that turtle egg hunters sell turtle eggs in the market as an additional source of livelihood.

6.2 Olive Ridley Turtle Population

6.2.1 Types of turtles

The sea turtles that lay eggs in TanjungMampie and Mampie Beach during the study were the olive ridley turtle (Lepidochelysolivacea) or in the local language called panyyu presented in Figure 11b. Based on data from the Friends of Turtle Community, the olive ridley turtle was recorded as the only type of turtle laying eggs in the sea. Mampie Coast since 2016. The olive ridley turtle is classified as a turtle that is unique compared to other types of turtles because the olive ridley turtle is not afraid of external disturbances such as light and sound (Lutz et al., 2003).

The tortoise has its own characteristics in determining the nesting habitat. The turtles that lay their eggs on the Mampie Coast after reaching the beach will look for places that are protected from disturbances such as light and predators. The spawning process on the Mampie Coast was found between 20.00 – 03.00 Central Indonesian Time.

6.2.2 Frequency of appearance of mother turtles

There are 95 turtles recorded laying eggs on the Mampie Coast from 2016 – 2018 totaling 95 individuals (Figure 12). Based on data from the Friends of the Turtle Community, the sea turtles lay eggs from February to July. There are 11 turtles laying eggs in Mampie Cape and 84 in Mampie Beach. Anova test obtained $P > 0.05$ indicates that there is no significant difference between the frequency of turtle laying eggs in Mampie Cape and Mampie Beach for the last 3 years (2016 - 2018). This shows that the data that will appear in the following year will also not have a significant difference between the two research stations.

The highest frequency of sea turtles occurred in 2018 (58 individuals) at Mampie Beach, while the lowest frequency occurred in 2016 (5 individuals) in Mampie Cape. There was a fluctuation in the frequency of turtles on Mampie Beach, where in 2017 there was a quite drastic increase, from 15 in 2018 to 58. This happened because the data collection on the frequency of turtle appearances on the Mampie Coast, especially on the Mampie Beach, had received great attention from the community so that they took part in the turtle protection process. Data on the frequency of turtles in the Mampie Coast is calculated based on the number of nests and turtle tracks found by the Friends of the Turtle Community in collaboration with the community.

6.2.3The success rate of hatching eggs

Overall the hatchery percentage in Mampie Coast shows a high hatching rate with an average percentage of 76.20%. Egg nests in Mampie Coast consist of natural nests and semi-natural nests. Natural nests are places where turtles lay their eggs naturally on the Mampie Coast. Semi-natural nests are turtle nests that are threatened with being submerged in the highest tides so that the eggs will be moved to a safer place (avoiding the highest tides). The semi-natural nest on the Mampie Coast was made by the Friends of the Turtle Community at the Turtle House conservation center.

The ANOVA test obtained (Figure 13) $P > 0.05$ indicates that there is no significant difference between the success rate of hatching turtle eggs inMampie Cape and Mampie Beach for the last 3 years (2016 - 2018). Figure 12 showsthatMampie Cape and Mampie Beach have a high average percentage of hatching success rates. Based on the results of the identification of the characteristics of the nesting habitat inMampie Cape and Mampie Beach, the coastal biophysics are within the normal range and are included in the criteria for the preferred habitat for turtles to carry out the nesting process. The condition of the unspoiled beach is one of the factors that influence the existence of turtles to lay eggs on the Mampie Coast. The failure of hatching turtle eggs in the Mampie Coast occurred due to the nest being hit by the highest tides of sea water. These nests were discovered by the manager of the Turtle House too late, so there was no relocation to a semi-natural nest in the turtle egg breeding center.The nesting period of turtles inMampie Cape and Mampie Beach occurs at different times. Egg laying inMampie Cape occurs in February – July while on Mampie Beach in March- June.

7. CONCLUSION

From the results and discussion of this research, it can be drawn as follows:

- Mampie Cape and Mampie Beach have ideal characteristics for turtles to land and spawn. This is because it is supported by the sloping physical factor of the beach, the sand fraction which is dominated by fine sand, the humidity of the sand and the temperature that is suitable for turtle laying and the development of egg embryos well.
- The presence of vegetation types on the Mampie Coast where the turtles nest with different species compositions, both in Mampie Cape which is dominated by thorn grass (Spinifexlittoreus) and on Mampie Beach which is dominated by hooves (Ipomeapes-caprae), making the two stations quite protected from the sun and other types of wildlife that pose a threat to turtle nesting.
- Turtle egg predators such as monitor lizards (Varanussalvator), sand crabs (Ocypodeceratophthalmus), cats (Feliscatusdomesticus), dogs (Canis lupus) and red ants (Aechophyllasmaragdina) pose a threat to the survival of turtle eggs. Other disturbances that can threaten the existence of turtle nesting nests are the activities of fishermen, tourists and the construction of embankments around the Mampie Coast.

- The ANOVA test shows that the frequency of turtles and the success rate of hatching eggs for the turtle eggs in Mampie Coast since the last 3 years (2016 - 2018) are not significant or not significantly different between Mampie Cape and Mampie Beach.

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