JOURNAL OF SCIENCE INNOVARE
https://journal.unpak.ac.id/index.php/jsi
Volume 01, Number 02, September 2018, Page 64-67
p-ISSN: 2615-3769 ; e-ISSN: 2615-3750

CONDITIONS OF HILLING HABITAT OF CHELONIA MYDAS (GREEN TURTLE) IN PANGUMBAHAN BEACH UJUNG GENTENG, SUKABUMI SELATAN

Meilisha Putri Pertiwi [a)], Suci Siti Lathifah[a)]

[a)]*Universitas Pakuan, Bogor, Indonesia*
Corresponding Author: suci.sitilathifah@unpak.ac.id

Article history: received 21 Juli 2018; revised 26 Agustus 2018; accepted 05 September 2018

Abstract. Research on the condition of the nesting habitat of Chelonia mydas (green turtle) in Pangumbahan Beach, Ujung Genteng, South Sukabumi has been carried out. Data retrieval is done 6 times for 2 days, 27-28 November 2017 at 3 observation stations. The abiotic parameters measured include surface temperature and depth of 50 cm, surface humidity and depth of 50 cm, beach width, beach slope, and the size of sand grains. While the biotic parameters measured were density, relative density, the frequency of attendance, and distribution patterns of Pandanus tectorius (sea pandanus) vegetation. Based on the results of data processing, the biophysical conditions in Pangumbahan Beach are still suitable for the Chelonia mydas nesting habitat. It also got clear evidence of the many Chelonia mydas landings during the data collection.

Keywords: Spawning habitat; Chelonia mydas; Pandanus tectorius

I. INTRODUCTION

West Java Province has amazing maritime potential. Not only in terms of tourism but also a home for animal and plant biodiversity. One of them is Pangumbahan Beach, Ujung Genteng, South Sukabumi. Quiet and not very light beach conditions are suitable as nesting habitat for green turtles (Chelonia mydas) (Dermawan [1]; Wiadnyana [2]; Panjaitan [3]; Wiadnyana [4]). In the turtle's life cycle in general (including Chelonia mydas), when entering the period of ready laying, it will return to the nesting nest before (Nuitja [5]; Satriadi [6]). So Pangumbahan Beach is an important habitat for Chelonia mydas conservation.

Indonesia has 6 species of turtles from 7 species that are owned by the world (Satriadi [6]; Wiadnyana [2]). This fact proves how rich Indonesia is with turtle biodiversity. Nevertheless, there are still many parties which do not support the existence of turtles. Even the conservation status of Chelonia mydas is on the red list of IUCN (International Union for the Conservation of Nature and Natural Resources), which is a species that in the near future is very at risk of extinction (Panjaitan [3]). This condition can be seen from the hunting of turtle eggs for sale and destruction of nesting habitats, for example, logging of sea pandanus trees (Pandanus tectorius) to be used as firewood (Susiarti [7]).

Vegetation Pandanus tectorius is a beachside decorating plant. Its function is more than just decoration but as a coast guard by breaking waves, preventing erosion, and abrasion (Keim [8]; Susiarti [7]). Vegetable beaches of Pandanus tectorius also function as turtle nesting sites. The jagged leaves protect turtle eggs from predators in the form of a wild boar. This vegetation is also able to maintain the temperature and humidity that is in accordance with the egg incubation process, so the turtle is comfortable to lay eggs (Wiadnyana [2]; Wiadnyana [4])

Other supporting factors for Chelonia mydas nesting habitat such as beach width, beach slope, and grain size, temperature, and sand moisture [9]. The location of Pangumbahan Beach, which is directly adjacent to the Indian Ocean, results in frequent large waves which result in the land which is being exposed to abrasion (Panjaitan [3]). This is also one of the threats to the nesting habitat of Chelonia mydas. Similarly, the warming conditions of the earth's temperature (global warming) can also have an impact on the survival of Chelonia mydas.

Research on the condition of the nesting habitat of Chelonia mydas (green turtle) on Pangumbahan Beach in Ujung Genteng, South Sukabumi is necessary. Research is expected to provide monitoring data on the current conditions of the nesting habitat. The current conditions are important to see the potential that needs to be developed (conservation efforts) and minimize the damage that occurs. The data is also expected to provide information for the proper Chelonia mydas conservation efforts. The right conservation effort is long-term savings for the sustainability of Indonesia's biodiversity.

II. RESEARCH METHODS

Research has been carried out in Pangumbahan Beach, South Sukabumi Ujung Genteng on November 27-28, 2017. Taking was carried out in 3 Observation Stations (SP), namely SP 1 with coordinates S07°19,795 'E106°23,805', SP 2 with coordinates S07

Volume 01, Number 02, September 2018, Page 64-67
p-ISSN: 2615-3769 ; e-ISSN: 2615-3750

719,795 'E106°23,779', and SP 3 with coordinates S07°19,706 'E106° 23,721'. Laboratory tests are conducted in Laboratory 2, Teacher Training and Education Faculty, Pakuan University.

The purposive random sampling method is used for sediment sampling. This method allows researchers to take samples from a population randomly with certain considerations by researchers. The parameters of this study include the physical beach and coastal vegetation, especially Pandanus tectorius.

Data collection is done by direct observation in the field and laboratory test measurements. Data taken includes beach width, beach slope, beach sand samples, temperature and humidity inside and outside sand, density, relative density, the frequency of presence, and distribution patterns of Pandanus tectorius.

The tools and materials used in retrieving data and samples are shown in the following table 1.

Table 1. Tools and Materials

Parameter	Unit	Tools	Information
Beach slope	Level	*Waterpas*, wood measuring 1.5 m, meter, rope	*In situ*
Temperature of sand	Level	*Soil tester*	*In situ*
Size of sand grains	Mm	Plastic bags, labels, markers, multilevel filters, digital scales (in the field), analytical scales	Laboratory
Beach width	meter	meter	*In situ*
Humidity of sand	%	*soilmeter*	*In situ*
Distribution pattern, density, relative density, frequency of presence of Pandanus tectorius vegetation	-	Rope, straps, meters	*In situ*

The work steps taken are measurements at each research station including:

a. Beach width
   1. Pull the meter perpendicular to the beach to the outermost vegetation boundary.
   2. Calculate and record the width of the beach
b. Temperature and humidity of the surface and depth (50 cm) of beach sand
   1. Dig sand to a depth of 50 cm
   2. Enter the soil meter and leave it for 1 minute
   3. Read and note the temperature and humidity information
c. Beach slope

The slope of the coast is measured using the Pythagoras principle.

1. Plug a scale on the boundary of the vegetation
2. Pull the rope perpendicular to the shoreline and straighten it with wood, then measure the length of the rope from the vegetation boundary to the beach boundary, and measure the length of the wood.

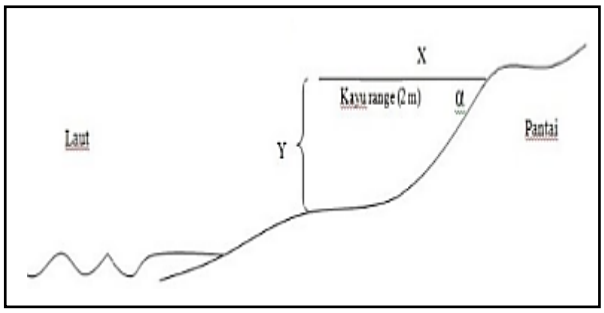

Figure 1: Measurement of beach width

a. Size of sand grains
   1. Take sand samples from each station of 25 grams
   2. The sample of sand is dried
   3. The sand sample is gradually added to the multilevel sieve and is recorded at what stage the sample is left behind

b. Density Kepadatan dan pola sebaran *Pandanus tectorius*

1. Population Density

$$\text{Density (Ind / m}^2) = \frac{individual\ number\ of kinds}{area\ of sample\ \ plot} \text{ x } 100\%$$

$$\text{Relative Density} = \frac{kinds\ of\ each\ density}{total\ of\ all\ \ density} \text{ x } 100\%$$

$$\text{Frequency of presence} = \frac{number\ of\ presence\ of\ a\ type}{the\ number\ of\ all\ samples\ observed} \text{ x } 100\%$$

2. Pola Distribusi

Determination of distribution patterns can be calculated using the Morista Index (Id). Morista Index Equations (Id) are as follows:

$$Id = \frac{N\sum x^2 - \sum x}{(\sum x)^2 - \sum x}$$

Information:
Id = Morista Index
$\sum x$ = the number of individuals per plot
$\sum x^2$ = the square of the number of individuals per plot
N = number of sampling plots
Conditions:
Id = 1 → random distribution pattern
Id > 1 → clustered distribution pattern
Id < 1 → uniform distribution pattern
(Michael [16]).

III. RESULTS AND DISCUSSION

Abiotic data

Data collection was carried out at 3 research stations (3 SP), 6 times for 2 days. SP coordinates as follows:
SP 1 →S07°19.795' E106°23.805'
SP 2 →S07°19.795' E106°23.779'
SP 3 →S07°19.706' E106°23.721'

Volume 01, Number 02, September 2018, Page 64-67
p-ISSN: 2615-3769 ; e-ISSN: 2615-3750

Table 2. Data on abiotic conditions SP 1, 2, and 3

Day/Date		Monday, 27-11-2017			Tuesday, 28-11-2017		
Parameter	Waktu	SP 1	SP 2	SP 3	SP 1	SP 2	SP 3
Surface temperature (◦ C)	08:00	28	27	28	27	27	27
	13:00	28	28	27	24	24	25
	17:00	27	27	27	28	28	27
Depth temperature 50 cm (◦ C)	08:00	30	28	30	27	27	28
	13:00	30	28	30	26	26	27
	17:00	28	27	28	27	27	28
Surface humidity	08:00	dry +	dry +	dry +	dry+	dry+	dry+
	13:00	dry +	dry +	dry +	dry+	dry+	dry+
	17:00	dry +	dry +	dry +	dry+	dry+	dry+
Depth humidity 50 cm	08:00	dry+	dry +	dry +	dry+	dry+	dry+
	13:00	dry +	dry +	dry +	dry+	dry+	dry+
	17:00	dry +	dry +	dry +	dry+	dry+	dry+
Beach width (m)		96	84	42	96	84	42
Beach slope (◦)		28,5	27	23	28,5	27	23
Sand grain size (mm)		0,21	0,5	0,21	0,21	0,5	0,21

Biotic Data

Biotic data measurements using a 5 x 5 m quadratic plot were carried out on the Pandanus tectorius vegetation population. Observation data as follows:

Table 3. Data on vegetation of Pandanus tectorius

Parameter	SP 1	SP 2	SP 3
Morista Index (Id)	5,67	5,19	5,15
Density	0,28	0,88	1,08
Relative Density	0,125	0,393	0,482
Frequency of presence	0,054	0,071	0,089

Research on the condition of Chelonia mydas nesting habitat has been carried out at three research stations (SP). SP 1 locations are in S07◦19,795 'E106◦23,805', for SP 2 are in S07◦19,795 'E106◦23,779', and SP 3 is at S07◦19,706 'E106◦ 23,721'. Description of the condition of the SP is almost the same namely fine sand with small gravel. The measurement results based on Table 2 also show that the size of SP 1 - 3 and is not much different. According to Bustard [10], the sand diameter of SP 1-3 is in the medium range. This condition shows the suitability of the sand substrate in SP 1-3 for the nesting habitat of Chelonia mydas. This is confirmed by the statement of the texture arrangement of the turtle nesting area in the form of sand not less than 90% with diameters between 0.18 - 0.21 mm and the rest dust and clay with fine and medium shaped granular diameters (Nuitja [5]. it makes it easier for turtles to dig nests. In contrast, large sand sizes make it difficult for turtles to dig (Ekanayake [11]).

Ewart (1979) states that the development of temperature regularly and gradually at temperature limits of 25-35 ◦C will result in good hatching rates and shortness of time to incubate. Limpus [12] adds that the temperature range between 22-23 ◦C is the normal limit for embryonic development. Meanwhile, the temperature needed for the embryo to develop properly is 24-33 ◦C. If the temperature of the turtle habitat is above the normal limit, the embryo will die and affect the sex of the hatchlings that will hatch (Hawkes [13]). Based on Table 2, the temperature range obtained both surface temperature and 50 cm depth is 27-30 ◦C. Therefore the temperature of SP 1 - 3 meets the requirements for turtle nesting habitat. While for the moisture parameters of sand, turtles like moisture that is small and tends to dry (Hitchins). This is also in accordance with observational data of SP 1-3 (Table 2), namely dry moisture. Humidity is related to storing water on the substrate. As discussed earlier, the substrate in SP 1-3 is sand. This sand media has the ability to store water by 30-40% with the effective water storage capacity of 20% (Seminoff [14]).

Measuring the width and slope of the beach is important. Both parameters are very influential on Chelonia mydas when landing and making nests. According to Dharmadi & Wiadnyana, the slope of the beach must be below 30◦ to the place where the nest is placed at a distance of 30-80 m above the coastline. 9. Based on Table 2, only SP 1 has a beach width of more than 80 m. SP 1 is not ideal for landing Chelonia mydas. As for the beach slope, all SPs are ideal for landing Chelonia mydas. According to Ekanayake [11] beach slope is positively correlated with water content and nest distance to vegetation. If the slope of the beach is sloping, then the water content of the substrate and the distance of the nest to the vegetation are greater.

Vegetation on the coast has a very important role to protect Chelonia eggs, iDdas, is directly exposed to sunlight, prevents sharp changes in the surrounding temperature, and protects the nest from predatory disturbances. In addition, vegetation also has an effect on humidity, temperature, and stability in the sand which provides safety when extracting nest holes (Bustard [10]). The type of vegetation found in spawning Chelonia mydas is Pandanus tectorius (sea pandanus) (Roemantyo [15]). This is in accordance with the conditions in the three SPs with sea pandanus as the majority of trees that grow. The presence of sea pandanus in each SP indicates an indication of the type or in the sense that the distribution pattern is clustered. This fact is supported by Table 3 which shows the value of Id => 1 for all SPs that indicate a clustered distribution pattern (Michael [16]).

Vegetation Pandanus tectorius (sea pandanus) has a good density, relative density, and frequency of attendance (Table 3). This illustrates that marine pandanus vegetation is suitable for the nesting habitat of Chelonia mydas. Making nests under the shade of sea pandanus is favored by Chelonia mydas because the roots can increase moisture and provide stability to the sand and do not interfere when extracting turtle nest holes (S. Dewi [17]). The authors also get clear evidence of the many Chelonia mydas landings during the data collection process. This reinforces the results of data processing in this study that Pangumbahan Beach, Ujung Genteng, South Sukabumi is still suitable as the nesting habitat of Chelonia mydas.

IV. CONCLUSION

1. Based on the processing of abiotic and biotic data, it can be concluded that Pangumbahan Beach,

Volume 01, Number 02, September 2018, Page 64-67
p-ISSN: 2615-3769 ; e-ISSN: 2615-3750

Sukabumi Selatan Ujung Genteng is still suitable for Chelonia mydas (green turtle) nesting habitat.
2. Conservation efforts that have been made to preserve the Chelonia mydas nesting habitat are good.

Suggestion

Research on the condition of the Chelonia mydas (green turtle) nesting habitat in Pangumbahan Beach, Ujung Genteng, South Sukabumi, can be the beginning of the next conservation step. Seeing the potential existence of the Pandanus tectorius vegetation, the authors suggest further activities in the form of community service with an environmental concentration. The activities are in the form of planting Pandanus tectorius seeds along with counseling to the community and tourists about the preservation of Chelonia mydas nesting habitat.

Acknowledgement

Acknowledgments the authors say to the Pakuan Siliwangi Foundation that has provided financial assistance so that this research can run smoothly.

REFERENCES

[1] Dermawan, A. 2002. *Marine Turtle Manageement and Conservation in Indonesia*. Proceeding of the Western Pacific Sea Turtle. Cooperative Research & Management Workshop. Western Pacific Regional Fishery Mangement Council, Honolulu Hawaii, USA. 67-76 pp.

[2] Wiadnyana, N.N. 2003. *Study on population and distribution of two common sea turtles, green turtle and hawksbill turtle in Indonesia*.

[3] Panjaitan, R.A., Iskandar, S.A.H. 2012. Hubungan perubahan garis pantai terhadap habitat bertelur penyu hijau (*Chelonia mydas*) di Pantai Pangumbahan Ujung Genteng, Kabupaten Sukabumi. *Jurnal Perikanan dan Kelautan* **3**(3): 311—320.

[4] N.N. Wiadnyana &. Roemantyo, A.S. Nastiti, 2012. Struktur dan komposisi vegetasi sekitar sarang penyu hijau (*Chelonia mydas* Linnaeus) Pantai Pangumbahan, Sukabumi Selatan, Jawa Barat. *Berita Biologi* **11**(3): 373—387.

[5] Nuitja, I.N.S. 1992. *Biologi dan Ekologi Pelestarian Penyu Laut*. Buku. Institut Pertanian Bogor Press. Bogor.

[6] Satriadi, A., E. Rudiana, & N. Af-idati. 2003. Identifikasi penyu dan studi karakteristik fisik habitat penelurannya di Pantai Samas, Kabupaten Bantul, Yogyakarta. *Ilmu Kelautan* **8**(2): 69—75.

[7] Susiarti, S. & M. Rahayu. 2010. Kajian etnobotani pandan samak (*Pandanus tectorius* Sol) di Kabupaten Tasikmalaya, Jawa Barat. *Berita Biologi* **10**(1): 113—121.

[8] Keim, A.P. 2007. 300 tahun Linnaeus: Pandanaceae, Linnaeus dan koneksi Swedia. *Berita Biologi* **8**(4a). *Edisi Khusus Memperingati 300 Tahun Carolus Linnaeus (23 Uei 1707—23 Mei 2007)*

[9] Anonim. 2007. *Sea turtles. Report of Survey. Study Location and Habitat turtle nesting Pangumbahan Regional District. Sukabumi and Regional Cipatujah,Tasikmalaya District Technical Report*. Research Institute For Fisheries Resources Enhancement.

[10] Bustard, R. 1972. *Sea Turtles; Hair Natural History and Conservation.* Taplingar Publishing Campany New York.

[11] Ekanayake, E.M.I., R.S. Rajakaruna, T. Kapurusinghe, M.M. Saman, D.S. Rathnakumara, P. Samaraweera, & K.B. Ranawana. 2010. Nesting behaviour of the green turtle at Kosgoda Rookery, Srilanka. *Cey. Journal Science (Biological Science)* **39**(2): 109—120.

[12] Limpus, C.J. 1984. *Laporan Diskusi/Seminar Penyu*. PHPA, WWF Indonesia, Marine Conservation Project, WWF Australia. BKSDA III. Bogor.

[13] Hawkes, L.A., A.C. Broderick, M.H. Godfrey, B.J. Godley, & M.J., Witt. 2014. *Coastal conservation.* Cambridge University Press, Cambridge: 310 hlm.

[14] Seminoff, J.A., T.T. Jones, A. Resendiz, W.J. Nichols, & M.Y. Chaloupka. 2003. Monitoring green turtles (*Chelonia mydas*) at a coastal foraging area in Baja California, Mexico: multiple indices describe population status. *Journal Marine Biology Association United Kingdom* **83**(?): 1355—1362.

[15] Roemantyo, A.S. Nastiti, & N.N. Wiadnyana. 2012. Struktur dan komposisi vegetasi sekitar sarang penyu hijau (*Chelonia mydas* Linnaeus) Pantai Pangumbahan, Sukabumi Selatan, Jawa Barat. *Berita Biologi* **11**(3): 373—387.

[16] Michael, P. 1994. *Metode ekologi untuk penyelidikan lading dan laboratorium.* UI-Press. Jakarta: xv + 616 hlm.

[17] S. Dewi, A., H. Endrawati, & S. Redjeki. 2016. Analisis persebaran sarang penyu hijau (*Cheonia mydas*) berdasarkan vegetasi pantai di Pantai Sukamade Merubetiri Jawa Timur. *Buletin Oseanografi Marina* **5**(2): 115—120.