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Painted terrapin (*Batagur borneoensis*) characteristics and existence in mangrove ecosystems on Pusung Cium Island, Aceh Tamiang Regency

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Abstract. Painted terrapin (*Batagur borneoensis*) is one of the animals whose status is almost extinct and is included in the list of protected animals based on PP No. 7 of 1999. Based on data from the International Union for Conservation of Nature (IUCN), the Painted Terrapin is ranked 25th out of 327 species in the world that are included in the rare category. The purpose of this study was to determine the number and characteristics of nests and the number of eggs of painted terrapin (*Batagur borneoensis*) in Aceh Tamiang. This research was conducted from November 2019 to January 2020 on Pusung Cium Island, Seruway District, Aceh Tamiang Regency. determination of the sampling location using a purposive sampling method at 2 observation stations. Painted terrapin nests are found only at station 1. Nests were found in November 9 pieces, December 7 pieces, and January 6 pieces, for a totalof 22 nests for 3 months. The number of eggs produced per hole is 11–27 eggs. Painted terrapin eggs are produced in November with 0 eggs, December with 11 eggs, and January with 97 eggs, for a total of 107 eggs for 3 months.

1. Introduction

Pusung Cium Island is a small island group with an estimated area of ± 30 ha, with the circumference of the island at the lowest tide of ± 4.83 km2. Geographically, Pusung Cium Island is located at 4^0 24' 16.9" - 4^0 23' 16.8" North Latitude and 98^0 17' 3.62" - 98^0 17' 14.72" East Longitude. Based on the government administration, Pusung Cium Island is included in Kampong Pusung Kapal, which is located in Seruway District, Aceh Tamiang Regency, Aceh Province [1].

Pusung Cium Island also has a large mangrove area where organisms can find food and play. The mangrove forest ecosystem found on Pucung Cium Island is a natural ecosystem that can protect settlements, buildings, and agricultural land from strong winds or seawater intrusion. In the mangrove

area found in Aceh Tamiang, the fruit of the mangrove vegetation of *Sonneratia* sp. is used as a food source for endemic fauna, namely the Painted Terrapin (*Batagur borneoensis*). A painted terrapin is an animal that has special features compared to other. turtles. Painted terrapin (*Batagur borneoensis*) is one of the three types of turtles that live in mangrove ecosystems besides *Batagur baska* and *Batagur affinis* [2]. The Painted terrapin is a reptile that has an important ecological role as a seed dispersal of mangrove plants, especially *Sonneratia* sp. This turtle is a type of large freshwater turtle whose natural distribution is only found in a limited number of locations in Southeast Asia. The district of Aceh Tamiang is one of the distribution areas for painted terrapin. The Aceh Tamiang District Government has established the Painted terrapin as a protected animal through Aceh Tamiang Regent Regulation number 2 of 2014 concerning the Protection and Preservation of the Painted terrapin and the Aceh Tamiang Regent's Decree number 63 of 2014 concerning the Determination of the Painted terrapin species as a protected animal in Aceh Tamiang District. The Painted terrapin (*Batagur borneoensis*) is an animal that belongs to 25 species of turtles that are rarely found. Status in the International Union for Conservation of Nature (IUCN): This species of painted terrapin (*Batagur borneoensis*) is included in the "Red List" as the critically endangered category, included in Appendix II of CITES [3]. The Indonesian government has listed this species as a high priority, namely Minister of Forestry Regulation No. P.57/MenHut-II/2008 concerning Strategic Directions for National Species Conservation 2008-2018.

2. Material and Methods

2.1. Time and location

This research was conducted from October to December 2019, located on Pusung Cium Island, Seruway District, Aceh Tamiang Regency, Aceh Province. The research station consists of 2 stations, namely station 1 with coordinates 4º23'48.53" North Latitude and 98º17'7.45" East Longitude, and station 2 with coordinates 4º23'20.62" North Latitude and 98º17'12.82" East Longitude.

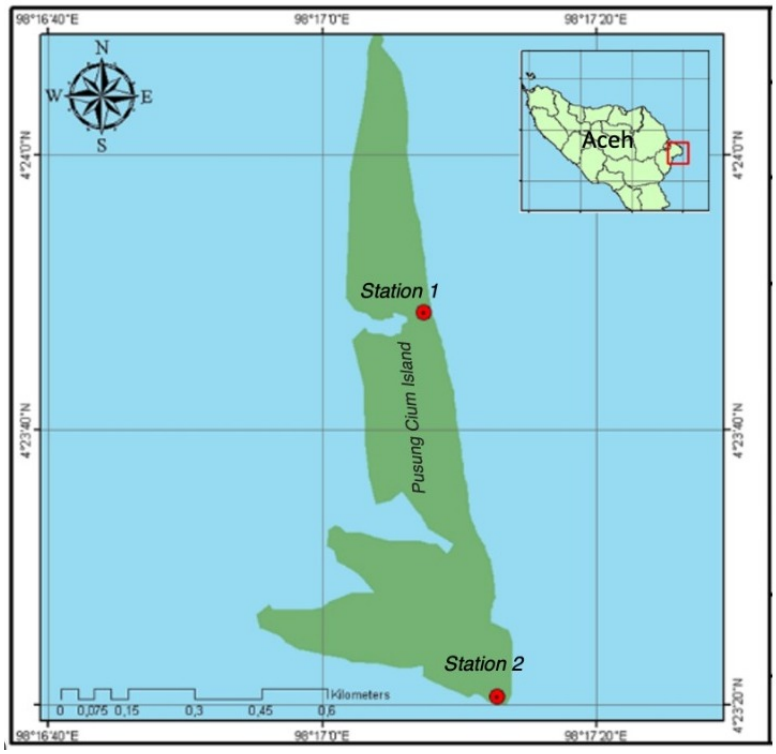

Figure 1. Research site map

2.2. Work procedure

2.2.1. Determination of research location
Research location is determined based on the purposive sampling method, where purposive sampling is a method not based on strata, random, or area but based on the existence of certain goals [4]. Station 2 is the habitat of the painted terrapin because the area has sandy characteristics.

2.2.2. Painted terrapin nest data retrieval
The painted terrapin nest data collection method used is the census method. The census method is to count the number of painted terrapins that rise to the seashore to build a nest. The data is collected in the form of primary and secondary data. Primary data is data taken directly from the field as well as from respondents recorded through interviews.

2.2.3. Manggrove Data collection
Supporting data collection in this study includes data collection of mangroves and substrates. Mangrove data retrieval was carried out at the same station as Painted Terrapin data collection with a transect size of 10 x 10 m^2 with 3 repetitions. Mangroves were counted in number and identified by their species. Mangrove analysis includes mangrove density.

2.2.4. Data collection on water physicochemical parameters and tuntong habits

Table 1. Measured physical and chemical parameters

Parameters	Method	Location
Temperature (^oC)	Thermometer	*Insitu*
Salinity	Refractometer	*Insitu*
pH	pH meter	*Insitu*
Dissolved Oxygen	DO meter	*Exsitu*

2.3. Data analysis

2.3.1. Calculation nest data
The information obtained includes the number of nests discovered as well as the diameter and depth of the holes in each nest. In addition, the painted terrapin found will be measured morphometrically. The data and information obtained in the field are presented in descriptive form.

2.3.2. Mangrove Density
Species density (Di) is the number of stands of the I species in a unit area. To determine the density of mangrove species using the formula [5],

$$Di = Ni/A$$

where,
Di = Density of species-i (ind/m^2)
Ni = Total number of individuals of species-i (ind)
A = Sample area total (m^2)

3. Result and Discussion

3.1. The number and characteristics of painted terrapin nests
The number of Painted terrapin nests found on PusungCium Island was 22 nests during 3 months of data collection. With 9 nests found in November, 7 nests found in December, and 6 nests in January, the average number of nests in 3 months of research is 1.2. The nest findings last year were based on data from the Satucita Lestari Foundation, where in December 2018 14 nests were found, in January 2019 1

nest was found, and in February 2019 4 nests were found. Data from the Satucita Lestari Foundation from December 2018 to February 2019 showed that the total number of nests in PusungCiumwas 19. At the time of the study, the total number of nests was found to be 22. This showsa slight difference between 2018 December to February 2019 and 2019 November to January 2020.

The Painted terrapin nest has a unique characteristic. To see the tuntong nest through tracing its footprints, namely up and down footprints, and to see around it, there is scattered sand resulting from the excavation of the sea tuntong, which is then closed. After laying eggs, the Painted terrapin sires will not return to see their eggs. This is the same thing that turtles do in general. When they are finished laying their eggs, they will not return to their nests.

Painted terrapinbrooders will return to the estuary where they will play and search for food in the water because the sea tuntong is 90% aquatic and 10% on land for laying eggs and sunbathing [6]. The depth of the painted terrapin nest is usually 20–31 cm before being measured at the time of egg transfer [7]. The depth of the nest obtained at the time of the study ranged from 18–30 cm.

3.2. Amount of eggs

The number of eggs found during the study in one hole ranged from 11 to 27 eggs. Based on those 3 months, namely, in November 0 or no eggs were found, while in December 11 eggs were found, and in January there were 97 eggs found at station 1. The average number of eggs in the 3 months of the research was 17.8. The total number of eggs found during the 3 months of the study was 107 eggs. Based on data from the Satucita Foundation, from December 2018 to February 2019, they received 123 painted terrapin eggs. [8] stated that each broodstock can produce 12 to 22 eggs.

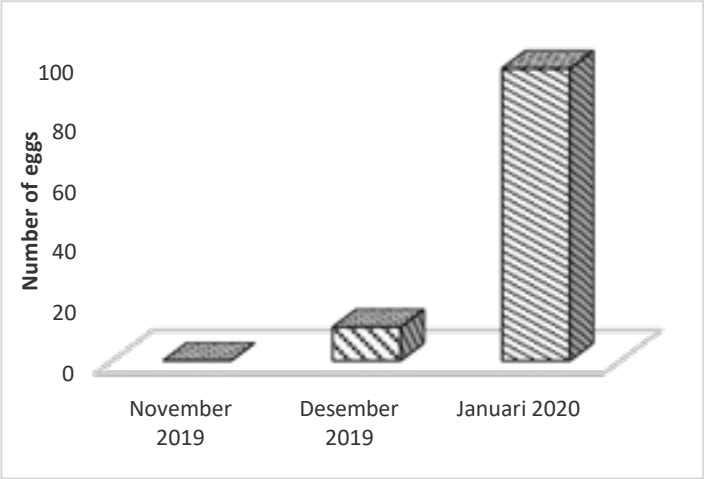

Figure 2. Number of nests found

In addition to human factors, coral reef ecosystems are also damaged due to natural factors. Damage tothe coral reef ecosystem in the study area due to natural factors is caused by the high intensit Based on Guntoro's [3] observations, [9] stated that disturbances in the decline of Painted terrapinhabitat in Aceh Tamiang were caused by the opening of oil palm plantations, logging for charcoal, illegal hunting of individuals and their eggs, and the presence of wild predators.

The population of Painted terrapins in nature has decreased due to the trade in live specimens as animals, consumption of eggs and meat, and loss of habitat [10]. The decrease in the number of tuntong eggs produced can be caused by several factors, both due to natural factors and the presence of predators that eat its eggs. The rainy season is a natural factor that affects the tuntong's ability to nest and lay eggs. This causes the sand to be difficult to excavate to be used as nests for egg laying by tuntongs. Besides that, the temperature of the nest during the rainy season is not suitable for tutongs to lay eggs.

3.3. The condition of the mangrovers as the tuntong habitat

At the observation location, there were 2 stations, where the number of nests and eggs was only found at station 1. The total number of nests during the 3 months of the research was 22 nests, and the number of eggs was 107 eggs. The condition of mangroves at station 1 and station 2 has little difference, because at station 1 we found 6 species and at station 2 we found 5 species of mangrove. Avecennia alba was the dominant mangrove at both stations, where tillers had the highest density at each station. The condition of the substrate at the two stations is also not much different, namely muddy, so that the productivity in this area is very high. It can be seen in the table below.

The results of field measurements showed that at station 1 there were 6 mangrove species, namely Rhizoporaapiculata, Rhizoporamucronata, Avecennia alba, Sonneratia alba, Bruguieraghymnoriza,and Ceriopdecandra. The highest mangrove density in the tree category was Avecenia alba species (17 ind/100m^2), while in the tiller category the mangrove density was also found in Avecenia alba species (14 ind/100m^2).

Meanwhile, at station 2,5 mangrove species were also found, namely *Rhizopora apiculata*, *Avecennia alba, Sonneratia alba, Bruguiera ghymnoriza,* and *Ceriop decandra*, with the highest density in the tree and sapling category also from Avecennia alba species (49 ind/100m2 and 31 ind/100m2). Painted terrapin is very dependent on mangroves because it eats fruits from mangroves (*Sonneratia* sp.).

Table 2. Mangrove density in Pusong Cium

Station	Mangrove Species	Mangrove Diversity (ind/100 m^2)	
		Tree	Tree Saplings
1	*Rhizophora apiculata*	9	58
	Rhizohporamucronata	2	0
	Avecennia alba	17	14
	Sonneratia alba	2	0
	Bruguieraghymnoriza	0	10
	Ceriopdecandra	0	7
	Amount	30	89
	Total	119	
2	*Rhizophora apiculate*	14	0
	Rhizohporamucronate	0	0
	Avecennia alba	49	31
	Sonneratia alba	0	0
	Bruguieraghymnoriza	0	1
	Ceriopdecandra	0	1
	Amount	63	33
	Total	96	

Adult Painted terrapins tend to be herbivores, eating riparian plants including grass stems, fruit of Pandanus sp. and parts of *Sonneratia sp*. such as fruit, flowers, and buds. Meanwhile, groups of young individuals consume more animal foods such as mollusks to get enough calcium and become herbivores when they grow up. Such feeding behavior is carried out at high tide when parts of vegetation such as low-hanging mangrove fruit are exposed to high tide [11].

The physical and chemical parameters of the waters taken during the research were temperature, salinity, pH, and DO with 3 repetitions. This can be seen in table 4.2. The measurement of these water parameters is used as supporting data to see the effect on the Painted Terrapin. The data can be seen in the table below.

The temperature measured on the field is 26 ºC and the average is 26ºC. The salinity measured on the field is 28 ºC, and the average is 28 ºC. The value of 28 ºC is high or salty salinity, while the painted terrapin can only live in salty waters for a maximum of two weeks. They can also pass through

this salty water to get to the estuary or low-salinity areas because they do not have glands to secrete salt water [6, 12].

Tabel 3. Measured physical and chemical parameters in the research location

Parameter	Repetition			Average
	1	2	3	
Temperature (°C)	26	26	26	26
Salinity	28	28	28	28
pH	6	6	6	6
DO	5.84	5.84	5.47	5.7

The pH measured in the field is 6, with an average of 6. DO in the measured waters is 5.84 and 5.47, with an average of 5.7. Saputra [6] said that the Painted terrapin has a high mortality rate when in salty waters, while the function of the mangrove in the sea tuntong is to neutralize the salt water that enters its body.

Conclusion

Based on the results of the research, it can be concluded that the nests found on Pusung Cium Island, 22nest were found in Aceh Tamiang, and the number of eggs found was 107 eggs during 3 months of observation. The depth of the nest in this research ranged from 18 to 27 cm and the width of the nest from 12 to 20 cm.

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