

Variation of Sea Turtle Hatch Morphology in Bantul Coast

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Abstract

This study aimed to determine the variation of sea turtle morphology on the Bantul Coast. Morphometric measurements of sea turtle species (*Lepidochelys olivacea*) were done and its morphology was observed. The results of the research were six morphological characters which showed significant differences between hatchlings on Pelangi and Goa Cemara Coast. The morphology between sea turtle hatchlings and the number of carapace 6 pairs, 7 pairs and 8 pairs obtained four significant differences.

Keywords: Morphometry, Sea turtle, Goa Cemara Coast, Pelangi Coast.

Introduction

The emergence of species diversity in every living creature in the universe is a proof of the power of the Creator of the universe, namely Allah SWT, so that people who are given His mind and power are higher than other creatures and ministers to become more confident and increase the level of devotion to The One Almighty God. We can consider this word of God in the Qur'an, Faathir (35: 27-28),

أَلَمْ تَرَ أَنَّ اللَّهَ أَنْزَلَ مِنَ السَّمَاءِ مَاءً فَأَخْرَجْنَا بِهِ ثَمَرَاتٍ
مُخْتَلِفًا أَلْوَانُهَا وَمِنَ الْجِبَالِ جُدَدٌ بَيْضٌ وَحُمْرٌ مُخْتَلِفٌ
أَلْوَانُهَا وَعَرَابِيٌّ سُودٌ

وَمِنَ النَّاسِ وَالْدَّوَابِّ وَالْأَنْعَامِ مُخْتَلِفٌ أَلْوَانُهُ كَذَلِكَ ۗ إِنَّمَا
يَخْشَى اللَّهَ مِنْ عِبَادِهِ الْعُلَمَاءُ ۗ إِنَّ اللَّهَ عَزِيزٌ غَفُورٌ

Meaning: "Do you not see that Allah sends down rain from the sky and We produce with it the fruits of various kinds. And in the mountains there were white and red stripes of various colors, and there were also black. And likewise, among men, creeping things and livestock there are various colors (and their types). Indeed, those who fear Allah among His servants are only scholars. Allah is Mighty, Forgiving."

According to the interpretation of Quraish Shihab, various types of fruits and differences in the colors of the mountains come from a common element - that is, fruits come from water and mountains come from magma, this verse also cites that there are different

shapes and colors in humans, reptiles and livestock are not visible from sperm which are the origin. Even if we use even a magnifying device, the sperm looks no different. This is where the secrets and mysteries of genes and plasma actually lie. This verse also suggests that genetic factors make plants, animals and humans still have their characteristics and do not change only because of their habitat and food. So it is true that this verse states that scientists who know the secrets of creation as a group of people who are most afraid of God.

Coasts in Bantul Regency are rich in diversity. Animals that live on the coast of Pelangi and Goa Cemara Beach is quite diverse such as shells, snails, hermit crabs, and crabs. In addition to some of these potentials, these two coasts are also used as landing sites for Gray Sea turtle (*Lepidochelys olivacea*). Sea turtle has experienced a decline in population in the last period and even some species are endangered (Budiantoro, 2017). Many people and tourists do not understand about the diversity of sea turtle that land along Bantul Beach. The type of sea turtle can be known directly from its morphology. Identification of sea turtle can be done at hatchlings.

Data from sea turtle body size and shape can be used to determine the level of differentiation from different populations (Anggriawan, 2015). Morphometric is one of the methods to see differences found in individuals or populations. These potentials, if used as learning resources, can provide adequate insight and knowledge. Many schools have not utilized the potential of the local or the surrounding environment as a source of learning.

The sea turtle morphology research was carried out to obtain data on the body shape and size of sea turtle hatchlings so that the level of differentiation from different populations could be identified, and obtain an overview of the morphological variations of the sea turtle.

Methods

This research was conducted from August to October 2018 at the Sea Turtle Conservation Center along the coast of Bantul. The equipment used in this study included stationery, meters, calipers (Krisbow digital calipers), GPS (Global Positioning System), coastal plant identification books, sample bags, and digital cameras. While the material needed is a sample of *L. olivacea* hatchlings from hatchery in captivity aged 1 to 3 days.

Measurement of samples in the field is measured directly with the caliper and meter. Parameters measured include body length (BL), carapace length (CL), carapace width (CW), head length (HL), head width (HW), front foot length (FFL), front foot width (FFW), head height (HH), back height (BH), curve length of carapace (CLC), curvature width of carapace (CWC), total tail length (TTL), plastron length (PL), plastron width (PW), back leg length (BLL), width of hind legs (WHL) and weight. Besides measuring these 17 characters, it was also noted the number of carapace pairs, where generally the *L. olivacea* hatchlings have a number of carapases of 6 pairs or more, which are not symmetrical between the right and left sides.

After the data was obtained, the data were analyzed using the Kruskal-Wallis Test and the Mann-Whitney test using SPSS version 16.

- The Kruskal-Wallis test was carried out to identify characters that showed a significant differentiation of the entire population compared to using a real level $p < 0.05$. That is to see the level of differentiation between sea turtle hatchlings with 6 pairs of costal scales, 7 pairs and 8 pairs.
- Two-way Statistical Test with Mann-Whitney U Test. Two-way test with Mann-Whitney U Test is intended to determine morphometric differentiation between two different populations. The statistics were done to see the difference of sea turtle in Pelangi and Goa Cemara coast. This test uses a real level $p < 0.05$.

Results and Discussion

From the results of the Mann Whitney test obtained 6 characters that showed a significant difference between sea turtle hatchlings in Pelangi and Goa Cemara coast, which is shown in table 1:

Table 1. Variations in morphological characteristics of *L. Olivacea* based on nest.

Character	Sea turtle on Pelangi Coast Nest (mm)	Sea turtle on Goa Cemara Coast Nest (mm)
BL	67,55	69,13
CL	0,5129	0,5359
HH	0,2065	0,2150
CLC	0,6743	0,6785
LLC	0,6573	0,6338
LP	0,4552	0,4839

The results of the study of variations in costal scales in the nest, the results obtained as the following table:

Table 2. Variation in the number of costal scales on nest.

Number of scales	Nest 1	Nest 2
	n=20	n=22
5~6	1	-
5~7	-	-
5~8	-	-
6~6	3	9
6~7	3	3
6~8	-	-
7~7	4	7
7~8	4	2
8~8	5	1

From table 2, it can be seen that the highest number of costal sea turtle is found in the nest one, with eight pairs of costal scales. While the highest number of individuals found in nest two is sea turtle with six pairs of costal scales. It can be seen that the character of the most number of scales from sea turtle which have six pairs of costal scales.

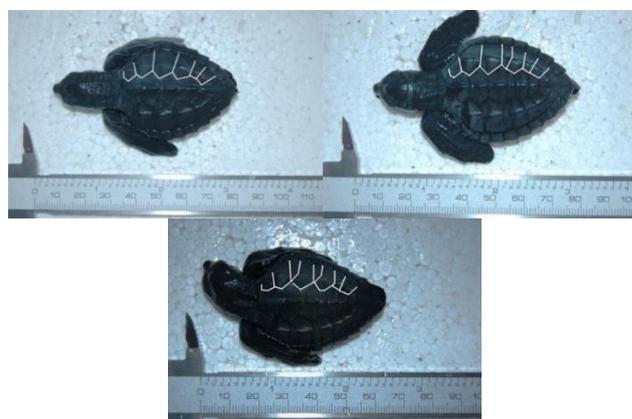


Figure 1. a. Sea turtle with six pairs of costal scales; b. Sea turtle with costal scales of seven pairs; c. Sea turtle with eight pairs of costal scales.

From the results of the Kruskal Wallis test between sea turtle hatchlings with the number of costal scales of 6 pairs, 7 pairs and 8 pairs obtained four characters showed significant differences, namely as in table 9 below:

Table 3. Variations in morphological characteristics on *L. Olivaceae* based on the number of Carapace.

Character	Costal scales are six pairs	Costal scales are seven pairs	Costal scales are eight pairs
	n= 12	n= 11	n= 6
BL	69,83 mm	68,90 mm	67,67 mm
CL	0,595	0,624	0,648
CW	0,532	0,519	0,505
HL	0,420	0,3958	0,3831
FFL	0,558	0,530	0,5222

The six differences in the characteristics of sea turtle hatch morphometry between Pelangi and Goa Cemara coast nests are significant, can be caused by many factors, including temperature, humidity and oxygen supply which may have affected the development of sea turtle embryos during the incubation period. The difference in environmental conditions on both beaches greatly determines the morphology of hatchlings that hatch. It is known that in the Pelangi coast nest, it has a shade in the form of paranet, so that sunlight does not directly hit the sand of the nest. While in the Goa Cemara coast nest, there is no shade over a semi natural nest, so that sunlight directly affects the nest's sand. This affects the temperature and humidity of the nests on both beaches. How to handle sea turtle eggs in both beaches is also possible to be one of the factors that affect the level of variability of sea turtle hatchlings.

The results of the study in variation number of costal scale found a considerable difference in of costal scales in each individual sea turtle individual from different nests in captivity. The difference in numbers ranges from six to nine costal scales. Variations in the number of scales can arise from disturbances during the development period.

Further research on the causes of variations in the scutes pattern in olive sea turtle is needed to explain the possible relationship between these variations with existing environmental factors. A better understanding of these relationships can greatly help the management and conservation of endangered sea turtle species. Through this analysis, theoretical considerations from existing aspects of conservation efforts can be made, even suggesting some methodological changes in conservation programs.

Thus, transplantation, translocation, and artificial incubation of sea turtle eggs can be evaluated by considering the possible impact on hatchling variability.

The effect of environmental conditions on the nature or characteristics of every living thing is a *sunnatullah* that we need to *tafakur* as His word in the Qur'an, Ar Ra'd (13: 4),

وَفِي الْأَرْضِ قِطْعٌ مُتَجَاوِرَاتٌ وَجَنَّاتٌ مِنْ أَعْنَابٍ وَزَرْعٌ
وَنَخِيلٌ صِنُونٌ وَغَيْرُ صِنُونٍ يُسْقَى بِمَاءٍ وَاجِدٍ وَنُفُصِّلُ
بَعْضَهَا عَلَى بَعْضٍ فِي الْأَكْلِ إِنَّ فِي ذَلِكَ لَآيَاتٍ لِقَوْمٍ
يَعْقِلُونَ

Meaning: "And on this earth there are side by side, and vineyards, plants and palm trees that are branched and unbranched, watered with the same water. We overestimate some of the plants for the other part about the taste. It is verily in that there are signs (the greatness of Allah) for those who think."

Conclusion

Variations of sea turtle hatch morphology between Pelangi and Goa Cemara coast obtained are 6 characters which showed significant differences, namely total length, carapace width, head height, carapace arch length, curved width carapace (LLC) and plastron width (LP). While variations in morphology of sea turtle hatchlings with 6 pairs of carapace, 7 pairs of carapace and 8 pairs of carapace were obtained 4 significant differences, namely carapace length (PC), carapace width, head length, and front foot length.

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