Typology of Olive Ridley turtle (*Lepidochelys olivacea*, Linn 1958) nesting habitat in Kuta Beach, Serangan Beach and Saba Beach, Bali Province

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Abstract. In Indonesia, the population sizes of Olive Ridley turtles in Kuta Beach, Serangan Beach and Saba Beach, Bali, tend to decrease due to habitat degradation. This study aims to describe the typology of Olive Ridley turtle nesting habitat in Kuta Beach, Serangan Beach and Saba Beach, Bali Province. Observation and in-situ measurements were conducted in November 2016 and February 2017 at nine stations using systematic sampling methods. The parameters measured were the number of nests, shore elevation, sand fractions, coastal vegetation, and shore width and length, which were analyzed using Principal Component Analysis (PCA) in order to see the correlation between the amount of nesting and nesting habitat typology. Our results show that the nesting habitat is characterized by low elevation of shore (0.89°-3.71°), shore width between 39.9-95.4 m, finest sand fraction (28%), and coastal vegetation dominated by *Hibiscus tiliaceus* (68.98%). PCA results indicated that fine sand fraction (grain size of 0.1-0.25 mm) and shore width are the main factors which characterizing the Olive Ridley turtle nesting habitat.

1. Introduction

1.1 Background

The Olive Ridley turtle (*Lepidochelys olivacea*) is one of the six sea turtle species found in Indonesia, and one of seven globally. Besides the Olive Ridley turtle, the green turtle (*Chelonia mydas*), loggerhead turtle (*Caretta caretta*), hawksbill turtle (*Eretmochelys imbricata*), leatherback turtle (*Dermochelys coriacea*), and flatback turtle (*Natator depressus*) are also found in Indonesia. Olive Ridley turtles are distributed all over the Pacific Ocean and the Indian Ocean [1]. In Indonesia, the Olive Ridley turtle are known to lay eggs on the beaches of large islands such as East Java, West Kalimantan, and Papua [2]. Olive Ridley turtle population in Indonesia tends to continue to decline, which cause is thought to be mainly anthropogenic rather than natural factors and predators [3]. Explicitly, the main threat of sea turtle population are anthropogenic activities, such as coastal and marine pollution, nesting habitat and feeding areas destruction, migration path disturbance, sea turtle consumption and trades, and the conversion of habitat as a place of tourism. As a result of the population decline, Olive Ridley turtle have been on the red list of the International Union for Conservation of Nature (IUCN) Vulnerable category [4].

The nesting habitat of Olive Ridley turtle are found to be located in tropical regions, in areas generally not overgrown by trees in a wide areas and bright with a lot of light [5]. Sea turtles generally choose coastal areas to nest, which is wide-ranging with an average slope of 30°, and inside the tidal range between 30-80 m. The eggs are placed in nests located between 8-41 m from the highest tide point in order not to be submerged in water. Olive Ridley turtle lay eggs 4 to 5 times a year with intervals between 10 to 14 days. Olive Ridley turtles are able to migrate as far as 2300 km from the nesting area [5].
Kuta Beach, Serangan Beach and Saba Beach in Bali Province are known to be the Olive Ridley turtle’s nesting habitat. The Kuta Beach is a sloping white sandy beach. The Serangan Beach has a sloping coastal topography with shore elevations ranging between 0%-2 %, and the highest point 3 m above sea level [6]. The Saba Beach has a length beach of 5 km, bordered the Pering beach to the east and Purnama beach to the west. Saba Beach black sandy and coastal vegetation such as a spruce shrimp. The topographies of the Kuta, Serangan, and Saba Beaches are thus ideal for Olive Ridley turtles to land and nest.

1.2 Research Purposes
Olive Ridley turtles are one of the many species of sea turtle landed and laying in Bali Province. Olive Ridley turtle nests are found in areas of Kuta Beach, Serangan Beach and Saba Beach. Despite the ecological characteristic of Olive Ridley turtle nesting habitat in these three beaches are still not yet unknown. Therefore, in order to understand the ecological characteristics of Olive Ridley turtle nesting habitat in these three beaches, research is needed. We thus conducted this research, which aims are to describe the typology of Olive Ridley turtle nesting habitat in Kuta Beach, Serangan Beach and Saba Beach, Bali Province. From this study, we expect to be able to obtain know the relationship between the typology of turtle nesting habitat and the number of turtles nest, especially those spread in Kuta Beach, Serangan Beach and Saba Beach, Bali Province, which will be useful for providing inputs for the management of Kuta, Serangan, and Saba Beaches as tourism spots, while considering the Olive Ridley turtles nesting habitats.

2. Method

2.1. Location and time
The research was conducted in Kuta Beach (Station Kt1, Kt2, Kt3), Serangan Beach (Station Sr1, Sr2, Sr3) and Saba Beach (Station Sb1, Sb2, Sb3), Bali Province (figure 1). Research is divided into three steps: (1) field observations in November 2016, (2) observations and measurements of the characteristics of nesting habitat in February 2017, (3) sediment analysis and data processing in March 2017 at the Environment Laboratory, Department of Aquaculture and Marine Bioprospecting Laboratory, Department of Marine Science and Technology, Faculty of Fisheries and Marine Science, Bogor Agricultural University.

2.2. Tools and materials
The tools used in this research is GPSmap Garmin 60CSx, stationery, laptop, digital camera, sample bottle, roll meter 100 m, rope scale 20 m, rope scale 10 m, sewing meter, waterpass, rapia strap, small shovel. The materials used are data of the number and type of sea turtles that landed and sand samples

2.3. Data collection
We used both primary data and secondary data. Primary data were obtained from observation and measurement of Olive Ridley turtle nesting habitat in Kuta Beach, Serangan Beach, and Saba Beach, all three in Bali Province. Measurements include the amount of nest parameter, shore elevation, shore width and length, sand fractions, type of closures and vegetation density. Secondary data includes the number of data and sea turtles species, sea turtle eggs findings from 2016 to March 2017.

2.3.1. Station determination. Determination of research station for data collection was based on preliminary observations by myself and preliminary records by tracing all shore areas previously reported to be often used as a place for sea turtles to land, either for laying eggs or not, in Kuta Beach, Serangan Beach and Saba Beach. Sampling based on systematic sampling. The distance between research stations is 500 m from the first point set at Kuta Beach, Serangan Beach and Saba Beach.
Figure 1. Location and research station in Kuta Beach, Serangan Beach and Saba Beach, Bali Province.
2.3.2. **Shore elevation.** The shore elevation is measured using a 50 m and 3 m scale meter for the long and altitude from the outermost vegetation to the lowest ebb. Waterpass used to maintain the straightness of the scale. Measurements start from boundary of outer vegetation to the lowest ebb.

2.3.3. **The amount of nesting distribution.** Sea turtle nesting distribution used belt transect method. Calculation the amount of nesting is done by draw a perpendicular line from the shore to the boundary of coastal vegetation, then the amount of nesting is computed visually in belt transect area as wide as 100 m.

2.3.4. **Substrate fraction.** Substrate sampling is performed on the nesting from the surface up to a depth 5-20 cm using a small shovel. Samples of sand are stored in 200 ml sample bottles, for subsequent analysis of substrate fractions.

2.3.5. **Coastal vegetation.** The method used in the measurement and inventory of vegetation is the multilevel sample plot method performed at each station. A sample plot of 20x20 m² is used to calculate mature trees (height > 1.5 m and diameter > 20 cm). The area of 10x10 m² to calculate pole trees (height > 1.5 m and diameter < 20 cm), while the area of 5x5 m² to calculate the saplings (height > 1.5 m and diameter < 10 cm), and the area of 2x2 m² to calculate the seedlings (height < 1.5 m and diameter < 10 cm).

2.3.6. **Shore long and width.** The measurement of shore long used meter and based on benchmark location. The measurement of shore width divided into three, is supratidal width measured from the outmost vegetation to the highest tidal boundary, the intertidal width measured from the highest tidal boundary and the total width calculated from the sum of the supratidal width and the intertidal width. Measurements were made at each station with a distance of 500 m.

2.4. **Data analysis**

Shore elevation measured by the formula:

\[ \tan \frac{\alpha}{x} = \frac{y}{x} \]  \hspace{1cm} (1)

Information: \( \alpha = \) elevation, \( x = \) total height (m), \( y = \) total width (m)

Analysis of the size of the sediment fraction is intended to determine the composition of sediments. The process of sediment fraction analysis is:

a. The sample was dried by oven 70 °C for 24 hours.

b. The sample was filtered using a multilevel filter.

c. Weight the samples that have been filtered from the size 2-0,063 mm.

d. Substrates that have been known percentage are then analysed and determined the type of substrate.

\[ T_r P = \frac{a-b}{a} \times 100 \]  \hspace{1cm} (2)

Information: \( T_r P = \) Total particles (%), \( a = \) Dry weight of sample (mg), \( b = \) Weight after spying (mg)

The measured coastal vegetation stucture includes the following parameters [7].

1) **Vegetation Density**

\[ \text{Density} \left( \frac{\text{ind}}{m^2} \right) (K) = \frac{\text{Number of individuals (ind)}}{\text{Plot area (m²)}} \]  \hspace{1cm} (3)

Relative Density

\[ \text{Relative Density} (\%) (KR) = \frac{\text{Relative density} (\%) (KR)}{\text{Density of all species}} \times 100\% \]  \hspace{1cm} (4)

Frequency

\[ \text{Frequency} (F) = \frac{\sum \text{Plot found a species}}{\sum \text{Plot of all species}} \]  \hspace{1cm} (5)

Relative Frequency

\[ \text{Relative Frequency} (\%) (FR) = \frac{\text{Frequency of a species}}{\text{Frequency of all species}} \times 100\% \]  \hspace{1cm} (6)
2. Domination

\[ \text{Domination (D)} = \frac{\text{Area of vegetation area}}{\text{Plot area}} \]  
\[ \text{Area of vegetation area} = \frac{nDBH^2}{4} \]  
\[ \text{DBH} = \frac{\text{The length of the tree circumference}}{\pi} \]  

2) Relative domination

\[ \text{Relative Dominance (\%) (DR)} = \frac{\text{Domination of a species}}{\text{Domination of all species}} \times 100\% \]

3) Important value index

\[ \text{INP} = KR + DR + FR \]

Information: \(\text{INP} = \) Important Value Index, \(KR = \) Relative Density, \(DR = \) Relative Domination, \(FR = \) Relative Frequency

2.5. The amount of nesting and habitat characteristic

Principal component analysis is a method of factorial analysis that allows a more readable representation or interpretation of the data structure by drawing essential information [8].

Centralization is the difference between the parameter value and the average value of the parameter [8].

\[ C = N_i - \bar{x} \]

Information: \(C = \) central value, \(N_i = \) initial parameter value, \(\bar{x} = \) the average value of the parameter

Reduction is the result between the value of the centralized parameter, with the standard deviation value parameter [8].

\[ R = \frac{C}{S_d} \]

Information: \(R = \) Reduction value, \(C = \) Initialized parameter value, \(S_d = \) Standard deviation

3. Results and discussion

3.1. Olive Ridley turtle nesting distribution

Olive Ridley turtle is the most abundant species of sea turtles nesting on the beaches of Bali Province. Olive Ridley turtle nesting season spawned from February to October. In the breeding season, the sea turtle mothers will ride to the beach then dig the sand to lay the eggs. Olive Ridley turtle spawn an average of 100 grains, with Olive Ridley turtle eggs shaped elips or round white, and skin that is chewy [5]. When compared to other sea turtles, the Olive Ridley turtle is because Olive Ridley turtles are not afraid of interference from outside like light and sound, although Olive Ridley turtles rose from the open seas and not to laying eggs. The incubation period of Olive Ridley turtle eggs is between 45 to 65 days [1].

The temperature of the nest affects the successful incubation of sea turtle eggs, which require a sufficient temperature range so that embryos do not rot and can thrive. A decent temperature for the development of turtle egg embryos is between 25-32 °C. Temperature will also determine the sex ratio of juveniles, where turtles are born from nests whose incubation temperature is greater than 28°C will result in female genitals [1]. [5] states that the temperature fluctuations occur at a depth of 15 cm below the surface, the more into the fluctuation diminishing and even gradually achieves stability.
During the research, there were 23 Olive Ridley turtle nests from nine stations (figure 2). The largest number of nests are found at Kt3 station located in Kuta Beach, while the smallest number of nests is located at Sr1 and Sr2 stations located in Serangan Beach. During the research from February to March 2017, the number of Olive Ridley turtle eggs found in Kuta Beach is 1677 eggs, the number of Olive Ridley turtle eggs found in Serangan Beach is 634 eggs, the number of Olive Ridley turtle eggs found in Saba Beach is 1822 eggs. The findings of Olive Ridley turtle eggs are dominated in nesting areas in Kuta Beach, Serangan Beach and Saba Beach. The findings of Olive Ridley turtle nesting were found in each research station.

3.2. Shore elevation
Shore elevation affect the amount of sea turtles that will land and make a nest, because the beach conditions are sloping and has fine sand can facilitate turtles to the mainland to find the location and make the nest as a nesting place. The steeper the beach will make it more difficult for sea turtles to see more distant objects because the sea turtles eyes is only able to see well at an angles of less than 150° [9]. In addition, sea turtles lay their nests 30 to 80 m above the highest tide [5].

Shore elevation in Kuta Beach, Serangan Beach and Saba Beach categorized slope slightly with a slope between 0.89°-3.71° and average slope 2.05°. The biggest slope located in Serangan Beach which has strong currents compared to Kuta Beach and Saba Beach. The number of coral fractions in Serangan Beach is more and has coral reefs in the intertidal zone and there is a coral dike nearby. Kt1 station located in Kuta Beach has the smallest slope and Sr1 station located in Serangan Beach has the biggest slope (figure 3).
3.3. Long and shore width

Kuta Beach has a length of about 2 km consisting of 3 observation stations. Serangan Beach has a length of about 1.5 km consisting of 3 observation stations. Saba Beach has a length of about 5 km consisting of 3 observation stations. The distance between observation stations on each coast is 500 m. The largest beach length is Saba Beach and the lowest beach length is Serangan Beach.

Kuta Beach has a shore width that ranges from 78-80.97 m to average 79.69 m. Serangan Beach has a shore width that ranges 58.7-78.86 m to average 71.02 m. Saba Beach has a shore width that ranges 39.90-95.40 m to average 63.60 m. The longest shore width is located at Sb3 station located in Saba Beach, while the shortest shore width is located at Sb2 station in Saba Beach. The intertidal width of each station ranges from 27.60-64.76 m with an average width of 50.23 m. The supratidal width ranges from 10.10-46.10 m with an average width 21.43 m. Kuta Beach, Serangan Beach and Saba Beach have different beach widths (figure 4).
Shore width in Kuta Beach, Serangan Beach and Saba Beach has a significant difference. Sr1 station located in Serangan Beach, Sb1 station and Sb2 station located in Saba Beach has a narrower shore width compared to other stations. Sr1, Sr2, Sr3, Sb1, and Sb2 station has a narrow width in the supratidal zone and the amount of Olive Ridley nests found is small. The size of nesting beaches greatly affects the accessibility of Olive Ridley turtle reaching suitable areas for making nests. Supratidal area is a dry area and is not exposed to sea tides, making it easier for sea turtles to make nests. The shore width which are used as sea turtles nesting ranged between 20-80 m [10]. The results showed the average width of the beach was 71.44 m which was in the wide range of beaches used as sea turtle nesting places.

3.4. Substrate fraction

Sand texture is related to the level of ease of digging the nest. Olive Ridley turtle generally prefer large and sloping beaches located on the top of the beach or above the highest tide line for nesting, with sediment arrangements of not less than 90% in the form of sand and the remainder being dust and clay, with fine grain diameters of sand and medium [5].

Kuta Beach and Serangan Beach generally have characteristic of medium and fine white and gray sand substrate which can be found at Kt1, Kt2, Kt3, Sr1, Sr2 and Sr3 station. Saba Beach generally has the characteristic of fine dark sand substrate found in Sb1, Sb2, and Sb3 station. Classification of granular diameter sand are grouped into 5 categories, which is very fine sand with a diameter of 0.05-0.10 mm, fine sand with a diameter of 0.10-0.25 mm, medium sand with a diameter of 0.25-0.50 mm, coarse sand with a diameter of 0.50-1.00 mm, very coarse sand with a diameter of 1.00-2.00 mm.

The texture of Olive Ridley turtle sand substrate was composed by very fine sand component 28.04%, 23.98% fine sand, 41.28% medium sand, 5.77% coarse sand, and 0.93% very coarse sand. Very fine sand and fine sand dominate the nesting beach more than 50% (figure 5). The percentage of very fine sand that has a value of more than 50% is located at Kt1, Sb1, and Sb2 station, and the lowest is in Kt2 station of 0.78%. The greatest percentage of fine sand is found at Sb3 station with value 35.90%, medium sand is in Kt2 station with value 87.84%, coarse sand found in Kt1, Kt2, Kt3, Sr1, Sr2 and Sr3 station, very coarse sand found in Kt2, Kt3, Sr1, Sr2 and Sr3 station (figure 5).

![Figure 5. Substrate fractions in nesting habitat Kuta Beach, Serangan Beach and Saba Beach, Bali Province.](image)

3.5. Coastal Vegetation

According to [11] coastal vegetation in the form of dense trees for sea turtle nesting gives a good influence on the stability of sea turtle nesting population. If the trees grow dense, the fallen leaves gradually decompose into mineral particles and drift into the sea. The process takes place continuously,
so the fertility of the waters can still be guaranteed. Fertility of waters become the needs of biota living in the area, such as the growth of seaweed and the availability of marine invertebrates in the form of zooplankton. Marine invertebrates are food needed by sea turtle populations that are still juvenile (hatchling). Vegetation along the nesting beach is dominated by coconut tree (*Cocos nucifera*), ketapang tree (*Terminallia catappa*), and waru tree (*Hibiscus tiliaceus*).

**Tabel 1.** Important value index (INP) vegetation in Kuta Beach, Serangan Beach and Saba Beach as an Olive Ridley turtle nesting places.

| No  | Species                | Important Value Index |
|-----|------------------------|-----------------------|
| 1   | *Hibiscus tiliaceus* (Waru) | 68.98                |
| 2   | *Cocos nucifera* (Kelapa)  | 60.56                |
| 3   | *Terminallia catappa* (Ketapang) | 56.24               |
| 4   | *Pandanus tectorius* (Pandan)  | 21.63                |
| 5   | *Barringtonia asiatica* (Butun)  | 20.38                |
| 6   | *Casuarina equisetifolia* (Cemara)  | 16.07                |
| 7   | *Morinda citrifolia* (Mengkudu)   | 12.79                |
| 8   | *Ziziphus mauritiana* (Bidara)   | 11.74                |
| 9   | *Corypha utan* (Gebang)         | 7.11                 |
| 10  | *Kibatalia arborea* (Kayu Santan) | 5.72                 |
| 11  | *Pongamia pinnata* (Kacang Kayu Laut) | 5.65               |
| 12  | *Leucaena glauca* (Lamtoro)     | 3.52                 |
| 13  | *Acacia auriculiformis* (Akasia) | 3.16                 |
| 14  | *Diospyros maritima* (Ki Geseng) | 3.11                 |
| 15  | *Calophyllum inophyllum* (Nyamplung) | 2.34                |

Coastal vegetation found from 9 stations covering 15 species of trees consisting of coconut (*Cocos nucifera*), waru (*Hibiscus tiliaceus*), akasia (*Acacia auriculiformis*), butun (*Barringtonia asiatica*), kayu santan (*Kibatalia arborea*), ketapang (*Terminallia catappa*), pandan (*Pandanus tectorius*), bidara (*Ziziphus mauritiana*), cemara (*Casuarina equisetifolia*), lamtoro (*Leucaena glauca*), mengkudu (*Morinda citrifolia*), kacang kayu laut (*Pongamia pinnata*), gebang (*Corypha utan*), ki geseng (*Diospyros maritima*), nyamplung (*Calophyllum inophyllum*). Waru (*Hibiscus tiliaceus*) is the species of vegetation that has the highest INP 68.98 %. Nyamplung (*Calophyllum inophyllum*) is the species of vegetation that has the lower INP 2.34 %.

The species of coconut is found in Kuta Beach, Serangan Beach and Saba Beach. At KT1 station there are 6 types of trees. namely coconut (*Cocos nucifera*). waru (*Hibiscus tiliaceus*). akasia (*Acacia auriculiformis*). butun (*Barringtonia asiatica*). kayu santan (*Kibatalia arborea*). ketapang (*Terminallia catappa*). At KT1 station grow the plant creep type of katang-katang (*Ipomoea pescaprae*). Types of coastal vegetation that have morphological stature (stems. leaves. crowns) such as coconut trees (*Cocos nucifera*). waru (*Hibiscus tiliaceus*). dan ketapang (*Terminallia catappa*) causing the area to become more naturally protected from predatory disturbances [12]. This is one of the factors that is appropriate for sea turtles to nest and lay eggs.

3.6. The amount of nesting and habitat characteristic correlation

The parameter of Olive Ridley turtle nesting habitat used in the principal component analysis to analyse the association of nest numbers and habitat characteristics. the amount of nest (JS). shore elevation (KP). long and shore width (LP). coastal vegetation (VP). and sand fractions which grouped into 5 categories. which is very fine sand with a diameter of 0.05-0.10 mm. fine sand with a diameter of 0.10-0.25 mm. medium sand with a diameter of 0.25-0.50 mm. coarse sand with a diameter of 0.50-1.00 mm. very coarse sand with a diameter of 1.00-2.00 mm.

The results of PCA centered on three major axes where each axis (F) contributes to the relationship between nest numbers and nesting habitat characteristics in Kuta Beach, Serangan Beach and Saba Beach. The first axis (F1) contributes 52.40% (the root value of feature 4.72). the axis 2 (F2) contributes
19.34% (the characteristic root value 1.74). and the third axis (F3) contributes 13.58% (value of root characteristic of 1.22).

Parameters that have a strong enough correlation with the first axis (F1) are shore elevation (KP) with a correlation value of 0.92 and medium sand fraction (PS) with a correlation value of 0.85. Shore width (LP) with a correlation value of 0.98 and the amount of nest (JS) with a correlation value of 0.45 has a fairly strong correlation with axis 2 (F2). Coastal vegetation (VP) with a correlation value of 0.89 and the amount of nest (JS) with a correlation value of 0.59 has a fairly strong correlation with axis 3 (F3).

Graph of relationship of the two major axes (F1 and F2) on figure 6 (a) shows the existence of two clusters that illustrate the relationship between the distribution of observation stations and habitat variables. Group 1 consists of stations Kt1, Kt3 and Sb3 which are characterized by the amount of nest (JS) ≥ 3 on a fine sand beach (PH) with a percentage 31.05-35.9% and shore width (LP) between 39.9-95.4 m. At Sb1 station has a very fine sand fraction (PSH) with a percentage 50.25%. Group 2 includes Sr1 station which has shore elevation (KP) with an angle of 3.71°, coarse sand fraction (Pkr) with a percentage 22.97%, shore width tends to be narrow with pandan vegetation (Pandanus tectorius) with INP 55.56. Graph of F1 and F3 axis relation on figure 6 (b) shows Sb3 station has a shore elevation of a sloping beach with an angle of 0.99° there is fine sand fraction (PH) and very fine sand fraction (PSH) the numerous and wide beaches are long. In addition to this station found the amount of nest (JS) more eggs than Sb1 and Sb2 station.

Graph in figure 6 shows a close correlation between variables the amount of nest (JS), fine sand (PH) and shore width (LP). Fine sand makes it easy for Olive Ridley turtles to dig up the nest. and the width of the unbroken beaches makes it easy for Olive Ridley turtles to make nests.

![Biplot (axes F1 and F2: 71.74 %)](image1)

![Biplot (axes F1 and F3: 65.98 %)](image2)

Information:
St: Station JS: The amount of nest; KP: Shore elevation; LP: Shore width; VP: Coastal vegetation; PSH: Very fine sand; PH: Fine sand; PS: Medium; Pkr: Coarse sand; Pk0: Very coarse sand.

**Figure 6.** Results of PCA habitat parameter and research station on axis F1. F2. dan F3; (a) Axis F1 and F2. (b) Axis F1 and F3.

### 4. Conclusions

Olive Ridley turtle is one of sea turtle species that many nesting Kuta Beach, Serangan Beach and Saba Beach. Olive Ridley turtle nesting habitat typology in this three beaches a gently sloping beach with a slope 0.89°-3.71°, shore width between 39.90-95.40 m. very fine sand fraction (diameter 0.1-0.25 mm) dominant and coastal vegetation dominated by Waru trees (Hibiscus tiliaceus) with the average INP 68.98%. Of the three nesting habitat locations. Kuta Beach (Kt1, Kt2, Kt3 stations) has the highest percentage of nesting followed by Saba Beach. Habitat in Kuta Beach and Saba Beach high potential as a sea turtle protection area. due to the slope of its shore elevation. shore width with vast expanses. Olive
Ridley turtle nesting habitat at Kuta Beach. Serangan Beach and Saba Beach can be an ideal nesting beach for Olive Ridley turtles.

**Recommendation**  
Need to do research on other species of sea turtle nesting habitat profile that ever nesting at several tourist beaches in Bali Province.

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