

Marine tourism and the locations of protected turtles on Sukamade Beach, Meru Betiri National Park, East Java

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Abstract. The research was conducted in Sukamade Beach, Meru Betiri National Park, East Java. The purpose of this research was to identify marine tourism activity and to determine the differences in the characteristics of turtle-nesting beaches towards the number and species of turtles that came to the beach. Data collection conducted in August-September 2014. The method used in this research was a survey method at 7 research stations to collect primary data (biophysical characteristics) and secondary data. The Primary data was collected by monitoring turtles, width and slope of the beach, temperature, pH, moisture, sand texture, and beach vegetation conditions at each station. The results of the research shows that marine tourism always involve tourists who attend to see turtle nesting, when turtles arrive at the beach, and turtles return to the sea, how large the turtles and how they lay eggs on the beach, and the release of little turtles (tukik). The number of turtles that landed from station 1 to station 7 is as many as 311 individuals of three species. The most dominant species of turtles that arrived at the beach is green turtle (*Chelonia mydas*), followed by olive ridley turtles (*Lepidochelys olivacea*) and leatherbacks turtles (*Dermochelys coriacea*).

1. Introduction

Indonesia is a maritime country with approximately two-thirds of its territory in the form of water, thus possessing a high potential of marine resources. These potential marine resources should be organised and preserved as optimally as possible in order to improve the well-being of communities without interfering with environmental sustainability. One of the marine resources with potential is the existence of turtles in Indonesia. Indonesia's aquatic habitats and tracks are suitable for turtles migration. The abundance of biological resources and the very high biodiversity are the main attraction for the park. Six out of seven types of turtles that exist in the world have habitats in Indonesia, namely the dark turtle (*Lepidochelys olivacea*), leatherbacks (*Dermochelys coriacea*), green sea turtle (*Chelonia mydas*), hawksbills (*Eretmochelys imbricate*), flatback (*Natator depressus*) and loggerhead turtles (*Caretta caretta*). Whereas Kempfi turtles (*Lepidochelys kempfi*) are only found in the waters of Florida and the sea of Mexico [1].

Tourism development is one of the methods suitable in managing and utilizing the area, especially for areas with potential and attractions that can trigger the interests of domestic tourists to visit the region. The main potential of the region is the appearance of Sukamade (aggregation) turtles around the beach which serves as a main tourist attraction. The fertile waters with abundant of food resources make the waters in Sukamde region an area that is suitable for turtle migration and egg laying on the beach.



Turtles are reptiles that inhabit the sea and their presence have long been threatened both by natural or human activities alike. Internationally, sea turtles are categorized into "endangered" species by the International Union for Conservation of Nature and Natural Resources (IUCN), which means they are listed on the Red Data Book. Whereas in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), all sea turtles are entered in Appendix I, which means that no sea turtles may be bought due to the number traded in nature and the fear of turtles being an endangered species [1]. Therefore, turtle conservation efforts are important to protect and save turtle populations.

Turtles have a high economic value. Almost all parts of the turtle can be utilized to support human life. Turtle shells can be manufactured into a variety of products like frames, glass eyes, bracelets, necklaces, household furniture and various ornaments. Their meats and eggs are also a source of animal protein for humans [1]. One single turtle serves a large number of benefits which also endangers their existence and preservation when it is done without control.

Turtle protection is carried out due to declining population in the wild. Data from various sources show that the turtle population in Indonesia has dropped drastically, especially during the last two decades. A number of observations on spawning locations show that population decline could reach 80% (average 70 %) compared to their population 15 years earlier [2]. No wonder that lately the turtle population is reported to have declined drastically in some areas as a result of hunting and taking too many of their eggs without giving them a chance to hatch naturally. The extinction of turtles in the region will increase if their egg-laying habitat suffer damage.

There are several places in Indonesia that have become turtle spawning grounds, which incorporates the South and North beaches of Indonesia. One of them is in the coast of the Meru Betiri National Park in Sukamade, East Java. The Sukamade UPKP (Turtle Conservation Management Unit) located on the beach is a special group that manages the conversion of the Sukamade coast into a turtle conservation area. There are 4 types of turtles in the Sukamade Coast region i.e. green turtles (*Chelonia mydas*), the Dark Turtle (*Lepidochelys olivaceae*), Hawksbills (*Eretmochelys imbricata*), Leatherbacks (*Dermochelys coriacea*). Currently green turtles are the types found most often during the search.

Sukamade Beach is one of the places that is suitable for green turtles to lay eggs. The characteristics of the Sukamade coast is generally the same as the beaches of the south coast of Java namely waves and clear water. The beach spawning area tends to have distinctive characteristics that may affect how the turtles land, including season, availability of food in the ocean and biotic and abiotic components of the spawning beaches. The beach in Sukamade is the most productive location for turtle spawning in East Java. The difference in the number and type of turtles that land are caused by turtles which tend to choose their own spawning locations. The selection of spawning locations are influenced by biotic and abiotic component factors that can be viewed from the type of sand, slope of the beach, sand beach width, temperature, vegetation and the atmosphere around the coast.

Until now, information about the characteristics of the protected environment around the Sukamade Coast is still relatively scarce. This research was conducted at the Sukamade Coast protected area by describing the physical and biological factors for each location or observation station. Knowledge about the relationship between the environmental characteristics with the number of turtles that migrate is indispensable in order to serve as input for the management of turtle conservation and preservation. As for the purpose of this research is to know the difference and the characteristics of the turtle spawning beaches at several points and locations organised around the Sukamade Coast station, the spread of the number and types of turtles, as well as the turtles' tendency of choosing their preferred spawning locations and nesting locations.

This rich natural potential has been supported by suitable management and policies, a method of collaborative management has already been applied and carried out after the promulgation of the legislation regarding collaborative management systems namely the Regulation of the Minister of Forestry (Permenhut) Number P. 19/Menhut-II/2004. It refers to a collaboration in the management of the area and the preservation of the natural sanctuary. Collaborative management includes

stakeholders managing the national parks directly or indirectly which include the National Park Hall, local authorities, indigenous people, NGOs, TNI/POLRI, Scientific Institutions, mapping and training, as well as religious institutions [3].

2. Methodology

This research was conducted from May to October 2014. Data retrieval was performed on September 2014 at the Sukamade Coast National Park and the Meru Betiri National Park, Banyuwangi, East Java. The study area at TNMB is located in the province of East Java with the longitude of 113°58 ' 38 "– 113°58 ' 30" and 8°20 ' 48 "– 8°33 ' 48" S whereas administratively, Meru Betiri National Park is located in two districts namely the Jember and Banyuwangi districts.

The tools used in this study consist of GPS (Global Positioning System), meter rolls, soil testers, thermometers, refractometers, pH meters, DO meters, TMD software (Tide Driver Model), KUMMOD software, Google Earth software, and vegetation life forms. The materials are used to gather primary data which is then utilized to gather secondary data. The primary data include interviewing 10 tourists on site, composing physical or abiotic component parameters (width of the beach, slope of the beach, great composition and grains of sand, sand temperature, pH, and moisture), biotic or biological parameters (condition of vegetation and fauna), water quality parameters (pH, DO, salinity and temperature), and monitoring turtles for research. The secondary data is comprised of the amount and types of turtles that migrate from UPKP (Turtle Conservation Management Unit) at the Sukamade Resort, tidal data at the Sukamade beach during August-September 2014 which was obtained from the tidal model Global TMD (Tide Model Drivers), and the average precipitation per-day over the span of one month on the beaches of Sukamade during August-September, satellite data obtained from TRMM (Tropical Rain shower Measuring Mission) that can be correlated with the map from Google Earth software. Additionally, tourists and the manager of Sukamade Beach were interviewed to gain insight on tourist activities.

The method used was a survey method by observation, inspection, interview and direct measurement on the object of study in the field and its description. The research location is Sukamade Coast with stations in seven locations. Below is a picture of the overview map of the data retrieval station.

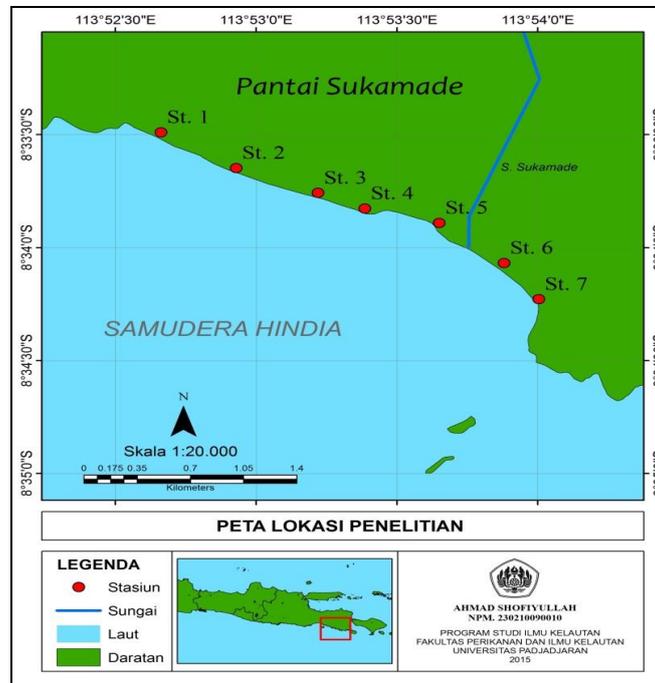


Figure 1. Data capture stations on the coast of Sukamade.

The methods of data analysis used are the descriptive comparative method which compares data observations of one station to the other, and discussing them through the use of literature study. The data obtained at the time of observation is tabulated and presented in the form of text, tables, charts and images. Further observations at each station are in accordance with the descriptive analysis compliance which is based on the spawning location of sea turtles. Interviews and observing tourist activities in Sukamade Beach was also performed.

3. Result and Discussion

The general condition of the Sukamade Coast was measured during the research. The measurements include water quality parameters, namely temperature, salinity, dissolved oxygen (DO), and pH. The measurement was performed in the morning and randomly spread across the sea waters and estuaries of Sukamade. The results are indicated on table 1 below.

Table 1. Water Quality Parameters.

Parameter	River		Sea		The Raw Quality*
	Range	Average	Range	Average	
Temperature (°C)	25-26	25.33	24-26	25	24-32
Salinity (ppt)	2-4	3.33	32-34	33	29-34
DO (mg/l)	4.60-5.80	5.23	4.80-6,20	5.37	> 4 mg/L
pH	7.18-8.16	7.74	7.18-8.44	7.93	7-8.5

Note: The decision of the Minister of the environment the number 51 of the year 2004

The results of the water quality parameter measurements at Sukamade Beach during the research show that some parameters are within the ideal range for the life of green turtles. This is based on the

raw quality of physical-chemical parameters of marine life as described in the Minister of Environment Decree number 51 of 2004.

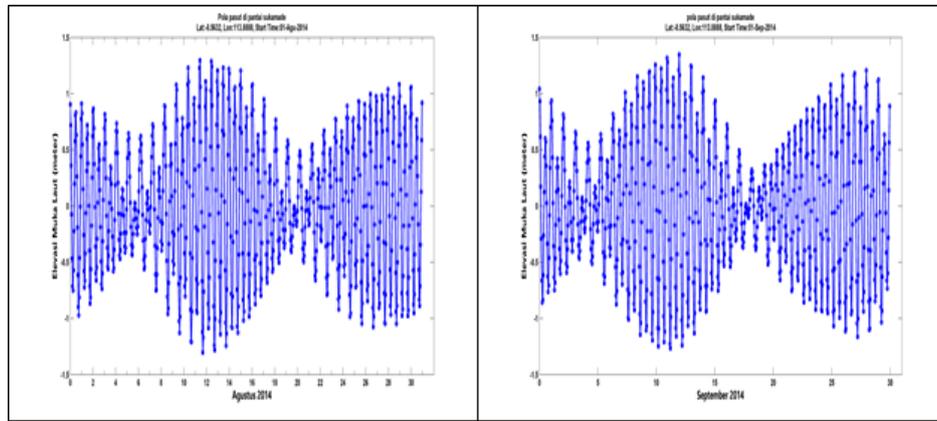


Figure 2. Elevation of the sea.

3.1 The difference in the characteristics of each Station.

Table 2. Description of the environmental characteristics of each station in Sukamade Coast with literature.

Parameter	Research results at each Station							Literature range	
	1	2	3	4	5	6	7		
Beach Width (m)	Min	46.74	64.29	73.51	45.86	66.76	54.92	1090	> 30-80 m from the furthest tide
	Max	78.05	89.43	99.32	66.58	73.82	64.52	19.05	
The slope of the Beach (α°)		8.08	6.42	7.40	7.16	15.36	9.57	11.89	< 30°
The temperature and depth of the sand 30-50 cm ($^\circ\text{C}$)		28.41	28.22	27.52	27.67	26.59	27.22	27.15	24°-33° C
Composition and large grains of sand	Total deposit of sand substrate (%)	99.85	99.99	99.98	99.99	99.99	99.99	99.97	Sand Fraktion $\geq 90\%$ & large-sized grains of sand 0,10-0,50 mm (fine-medium)
	Medium-fine sand (%)	98.85	92.38	74.40	88.00	93.67	96.97	99.,16	
Sand pH		6.20	6.80	6.60	6.60	6.60	6.80	6.20	6-9
Moisture Beach (%)		2.00	1.00	2.00	3.00	3.00	2.50	3.50	2-12 %
Vegetation condition		Dominant	Dominant	HT, IP	IP, CD	Dominant	-	Dominant	Dominated by vegetation:

(HT), the rest of it (PT, SL, IP, CD, WD)	(PT, HT) & sisany a (WD)	(IP, CD)	(IP), & the rest of it (TC, AP, CI, SC)	Pandan sea (<i>Pandanus tectorius</i>), katang- katang, (<i>Ipomea pescaprae</i>), waru sea (<i>Hibiscus tiliacus</i>)
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Note: Vegetation condition

HT (*Hibiscus tiliacus*), PT (*Pandanus tectorius*), IP (*Ipomea pescaprae*), CD (*Cynodon dactylon*), SL (*Spinifex littoralis*), WD (*Wedelia biflora*), TC (*Terminalia catappa*), AP (*Abrus precatorius*), CI (*Callophylum inophyllum*), dan ST (*Scaevola taccada*).

Beach tourism is a type of tourism that prioritizes cultural activities and coastal communities such as recreation, water sports, scenery and climate enjoyment [4]. Shore excursions in Sukamade would be categorized as ecotourism involving special interests. Tourist satisfaction is obtained from the service provided by nature directly. The comfort level decreases when tourists are concerned for the sustainability of resources, especially when green turtles are concerned. The development of ecotourism should avoid direct exploitation of the green turtles at Sukamade Beach. Additionally, an alternative form of management is expected to benefit the community financially by preserving environmental sustainability.

The sustainability of the beach tourism area consists of 6 parameters, which are: the daily increase of the number of turtles, beach width, slope of the beach, depth, the basic materials of the beaches, water, closure of the land and surrounding beach [4]. There is also beautiful, natural panorama which include broad white sand, crystal clear water, dense and distinctive coastal vegetation, waves suitable for surfing, and increased activities of green turtles [4]. In this area travelers can enjoy the natural beauty of Sukamade Beach with both day and evening activities.

3.2 The number and types of turtles landed.

The observation results of the number of turtle landings in each station on August-September 2014 in the coast of Sukamade show differences in the number of turtle landings at each station (table 3).

Table 3. The number of Turtle landings At each Station.

Station	Turtle type	The Number Of Landings	Landing			
			Spawn	%	Memeti	%
1	Green	95	37	38.95%	58	61.05%
2	Green	66	33	50%	33	50%
	Olive Ridley	2	2	100%	0	0%
3	Green	50	27	54%	23	46%
	Olive Ridley	1	1	100%	0	0%
	Leatherback	1	1	100%	0	0%
4	Green	62	34	54.84%	28	45.16%
5	Green	23	10	43.48%	13	56.52%
6	Green	11	5	45.45%	6	54.55%
7	Green	0	0	0%	0	0%
Total		311	150	48.23%	161	51.77%

In table 3, we can argue that there are many green turtle nesting and spawning areas in Sukamade Beach. Tourists always want to see how the turtles arrive at the beach, how big the green turtles are, how they lay eggs. Tourists also want to be involved in the release of turtle hatchlings (*tukik*). Such activities which include ecotourism may or may not impact the natural environment. The possibility of such impact is always there, particularly the negative impacts for turtles [4]. Fostering tourists towards nature for the good of society, requires a thinker who has discernment and wisdom to help people. NGOs and experts were able to protect the turtles from extinction by making society aware of their plight and ensured their survival in Sukamade Beach. Legal support is needed to support ecosystems, as well as social, economic, and cultural factors.

More tourists are willing to enhance the quality and integrity of the area so that the ecosystem habitats of the green turtles will be more authentic. Tourists are expected to be more aware of the importance of conservation efforts. Tourism contributes a great increase in the income for both the local area and its community when it is managed in an integrated and sustainable manner. The current paradigm of tourism in the beach and sea areas is mainly focused on economic profits, which is attracts tourists without regard to preserving the environment [5].

Tourist are always interested to see:

1. Turtle nesting,
2. When the turtles migrate to the beach,
3. When the turtles return to the sea,
4. The large size of the turtles
5. How the turtles lay eggs on the beach
6. The release of turtle hatchlings (*tukik*).

Green turtles generally have the potential to attract tourists. Arrangements should be made to support the required area and to regulate tourists activities. Tourist activities are difficult to control and they often reduce the comfort of turtles [4]. This condition is threatening the existence of green turtles at Sukamade Beach. Turtle population decline in Sukamade Beach is caused by tourist visits, camping grounds, campfires, the usage of camera flash when taking photos, theft of turtle eggs, and fish nets.

Nature tours which focus on the turtles can only be enjoyed in intact ecosystems with a strong connection to their habitats [4]. The area has been determined as unsuitable for the development of ecotourism in the form of shore excursions due to fear of causing damage to the environment as well as the loss of species. Changes in ecosystems are difficult to be restored to its original state because their properties and recovery behaviours are not the same. Efforts to accelerate recovery time often require great manpower and funds. The design of turtle tours must be as exclusive tours. The total number of tourists must be restricted and shall not exceed the carrying capacity of the area [5]. For this reason, we will be conducting a carrying capacity study of the area in the next research.

An increasing number of tourists are attracted by the green turtles' natural, beautiful and unique habitats and spawning areas [6]. The uniqueness of the turtle is the main reason tourists come to Sukamade's beautiful beach. Being far away from home is also one of the considerations for tourists to come to Sukamade. Humans live in social communities with natural surroundings and whole layouts of natural environment, and are also one with intellectual power, and serves as a natural means of economic nature layout. The Turtle Spawning Manager has the task of making rules that should be followed by tourists who come to see the turtles spawn, land, return to the sea, how large the turtles are when they lay eggs and the release of turtle hatchlings (*tukik*). The Manager is obligated to create rules of how many tourists are allowed to come and see the turtles while at the same time maintain the sustainability of Sukamade Beach so it will still be favored by the turtles to spawn.

4. Conclusion

Marine tourism was developed at Sukamade Beach for turtle viewing. Tourists come to see the turtles nesting, when they land, when they return to the sea, how large they are, how they lay eggs on the beach and also the process of releasing the turtle hatchlings (*tukik*). Green turtles are found in seven stations, while Olive Ridley turtles are found in two. Leatherback turtles are only found in one station. The favorite vegetation chosen by the turtles are HT (*Hibiscus tiliacus*), PT (*Pandanus tectorius*), IP (*Ipomea pescaprae*), CD (*Cynodon dactylon*), SL (*Spinifex littoralis*), WD (*Wedelia biflora*). For Leatherback turtles, they prefer HT (*Hibiscus tiliacus*) and IP (*Ipomea pescaprae*). The manager has the task of show the nesting sites, accompany tourists to the site and try to give interesting information about the turtles. This can help avoid the destruction of the turtle nesting sites.

5. References

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