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Threats to the Sea Turtles and Shortcomings in Conservation Practices: A Geographic Assessment of Nesting Sites at Kosgoda Beach, Sri Lanka

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Abstract: ***Kosgoda Beach on the southwestern coast of Sri Lanka supports nesting by five globally recognized sea turtle species. This study examines the main threats affecting nesting processes and evaluates the effectiveness of conservation centres operating in the area. Fieldwork was conducted using participant observation, semi-structured interviews, and group discussions with conservation staff, local residents, and volunteers between June 2024 and June 2025. The findings reveal persistent human pressures, including poaching, egg collection, tourism-related disturbance, and bycatch, alongside weaknesses in hatchery management and release practices. Natural predation and pollution further intensify stress on nesting populations. The analysis highlights the tension between ex-situ hatchery operations and the need for stronger in-situ habitat protection under state regulation. Strengthened policy enforcement, ethical tourism management, and community-based conservation are recommended to safeguard long-term population stability at Kosgoda.***

Keywords: Sea Turtle, Kosgoda Beach, Hatchlings, Threats, Sea Turtle Conservation Centres

1. Introduction

Sea turtles are part of coastal ecosystems facing numerous challenges in recent years (Thilakarathne et al., 2024) [26]. The challenges for sea turtles, their habitats, nesting processes, and hatchlings have drawn attention to the need for more research and the transformation of conservation practices towards a sustainable way. In Sri Lanka, the sea turtle nesting beaches along the western, south-western, southern, and southeast coasts extending between Mount Lavinia and Arugam Bay are regarded as highly vulnerable (Amarasooriya, 2000) [1]. Kosgoda beach in Sri Lanka is located in the Galle District, with favourable geographical, ecological and biological conditions for sea turtle nesting (Jayathikake et al., 2017) [14]. Its position falls within one of the migratory routes for marine turtles across the Indo-Pacific region (Richardson, 2019) [24]. This beach benefits from an average of twelve hours of darkness each day yearly, with sloping shorelines, fine-textured sand, appropriate temperatures, an extensive length of beach area, estuarine ecosystems, mangrove habitats, and a relatively attractive coastal environment for nesting. All these factors support the continuation of year-round nesting under favourable conditions with peak seasons between November and April. According to Ekanayake et al. (2002) [9], despite occurring year-round, the highest number of nesting in Kosgoda was recorded from early November to the end of April. Fortunately, Kosgoda is among the very few nesting sites in the tropical region where five species of sea turtles out of seven, visit for nesting (Deraniyagala, 1953, cited Rajakaruana, Dissanayake, Ekanayake and Ranawana, 2009; Perera et al., 2022) [21], [20]. The Green turtle (*Chelonia mydas*), Olive Ridley (*Lepidochelys livacea*), Hawksbill (*Eretmochelys coriacea*), Loggerhead (*Caretta caretta*), and the critically endangered Leatherback (*Dermochelys coriacea*) are recorded in Kosgoda for nesting. According to Amarasooriya (2000) [2], among the five species, the majority are Green turtles and Olive Ridleys. Luckily, all five sea turtles are still observable at Kosgoda, Induruwa, Rekawe and Bundala in the Southern Sri Lanka. This high diversity year-round in Kosgoda has earned it a title as 'sea turtle diversity hotspot' within Sri Lanka's coastal ecosystem. Further, it also highlights the vitality of the site in conserving sea turtles and protecting nesting habitats, along with Rekawa, where sea turtles have been conserved mainly based on in-situ methods. However, pressures on sea turtles include poaching of sea turtles and their eggs, coastal development, coastal tourism, pollution, and habitat degradation, as well as predators which pose significant threats to sea turtle populations and their nesting process in the Kosgoda beach (Wallace et al., 2011, cited Perera et al., 2022 and IUCN-SSC, 2025) [20], [12]. In the Kosgoda coastal belt, within four-kilometer distance, five major conservation centres are actively involved in conserving this threatened, innocent species. Despite Kosgoda beach playing a major role in nesting and incubation, it is increasingly threatened for nesting habitats, eggs, and incubation processes from both human encroachments and natural predators. However, within a short distance, the concentration of conservation centres highlights ongoing sea turtle nesting processes as well as the ecological significance of the area and the severity of threats they face. This highlights the necessity of maintaining the area for a safer nesting site and the critical need for effective conservation reforms, and the capacity of ecotourism, in supporting long-term sustainability. Furthermore, conservation centres in Kosgoda are not without shortcomings. The IUCN's conservation assessment highlights an urgent requirement for new measures in sea turtle conservation based on sustainable approaches (IUCN, 2024) [13]. According to Jayathilake et al. (2017) [14], it is necessary to declare the Kosgoda beach site as a protected nesting habitat by the government. Moreover, it is crucial to assess the current status of the Kosgoda nesting beach with various threats faced by the sea turtles. Moreover, it is equally vital to assess the shortcomings of the conservation centres in that adopt ex-situ conservation methods. The identification of primary threats to sea turtle nesting processes and the shortcomings of these conservation efforts is critical for

formulating effective long-term solutions based on a sustainable approach. The study also focuses on national conservation policy debates by providing research-based findings about sea turtle poaching and hatchery management practices in Kosgoda. It would open opportunities for long-term sustainability for sea turtle conservation and habitat management across nesting habitats and conservation centres in Sri Lanka. In addition, the study adopted global-level sea turtle conservation and management methods, which would contribute lessons that enrich both national policy reforms and broader international conservation.

2. Literature Review

Sea turtles with unique physiological adaptations have existed for over 100 million years, demonstrating remarkable evolutionary resilience to long-term changes in coastal geomorphology, climate, and environmental conditions (Bowen et al., 1993) [3]. Air-breathing reptiles that depend on their lungs for breath, which enable them to stay submerged for a long period, and they also frequently rise to the surface to bask and absorb heat from both sunlight and their ambient surroundings (Enstipp et al., 2025; Chessman, 2024) [10],[4]. There are seven recognised species of sea turtles worldwide: Leatherback (*Dermochelys coriacea*), Olive Ridley (*Lepidochelys olivacea)*, Kemp's Ridley (*Lepidochelys kempii)*, Hawksbill (*Eretmochelys imbricate*), Green turtle (*Chelonia mydas*), Loggerhead (*Caretta caretta*), and Flatback (*Natator depressus*) (Meylan and Meylan, 1999; Rathnayake, 2015; Christiaanse et al., 2024) [19],[23],[5]. Sea turtles play a dynamic ecological role in sustaining the richness of the coral reefs, seagrass beds, and the entire ecosystem function, which provides enriched habitats for various species (Meylan and Meylan, 1999) [19]. These keystone-harmless species face severe threats, especially in nesting beaches in tropical countries like Sri Lanka and indicate the urgent need for conservation efforts (Wallace, 2023; Thilakarathne et al., 2024) [27],[26]. According to IUCN (2024) [13], the Leatherback Turtle is listed as Critically Endangered, taking into consideration steep declines of populations subjected to several human-mediated threats. Wallace (2023) [27] describes that the Olive Ridley Turtle is also classified as critically endangered due to human impacts and predation. Besides, the Kemp's Ridley Turtle remains listed as critically endangered, as it nests only in a very specific area range and because of incidental capture in fisheries (Wibbles and Bevan, 2015) [29]. De Silva (2006) [8] points out that the Hawksbill Turtle is listed as critically endangered mainly due to wide, unregulated exploitation for carapace and continuing habitat degradation. State of the World's Sea Turtles (SWOT) (2021) [25] shows that the Green Turtle is listed as endangered mostly because of loss of habitats and bycatch issues, while the Loggerhead Turtle is listed as vulnerable. In Sri Lanka, conservation initiatives commenced with the efforts of enthusiastic individuals and organizations in the 1970s onwards. The first sea turtle centre was established within the precincts of Yala National Park in 1956. With time, private sea turtle conservation centres sprang up along the Western and Southern coasts. Sea turtle hatcheries are considered one of the ex-situ conservation approaches, which could provide artificial environments to protect and manage the populations of turtles. Wilson and Tisdell, 2005; Kapurusinghe, 2006; Rajakaruna et al., 2013 [30], [17], [22]. Marine turtles have been legally protected in Sri Lanka under the Fauna and Flora Protection Ordinance, administered by the Department of Wildlife Conservation, since 1 March 1937 (amended 20 July 1972). Jayathilake, 2017 [14]. Sri Lanka became a party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on 4 May 1979, prohibiting importation and exportation of sea turtles and their products, providing broader legal coverage for these species (Hewavisenthi, 1993; Richardson, 2019; Kapurusinghe and Saman, 2001; Rajakaruna, Dissanayake, Ekanayake & Ranawana, 2009) [11], [24], [15], [21]. However, almost all the conservation centres are managed by private owners. The centres are: Marine Conservation Centre, Vector H. Conservation Centre, A & A Conservation Centre, Galbokka Consecration Centre and Kosgoda Conservation Centre.

3. Methodology

This research methodology designates the rationale for the selection of the study area, the data collection techniques used, and the approaches of data analysis. Kosgoda beach has been selected as the study area for this study, which was identified as one of the most important sea turtle nesting beaches in Sri Lanka.

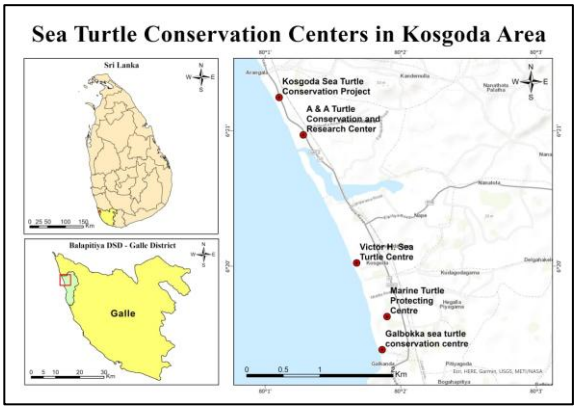

Figure 1: Kosgoda beach, located in the Galle district in Sri Lanka.
Source: Researcher, 2025.

The primary data collection consisted of participant observation cross-linked with semi-structured interviews, open-ended in-depth interviews, and informal discussions. Cross-linked participant observation was extremely helpful in validating the reliability of the information captured in interviews and in framing contextual comprehension of on-site conservation actions. Data collection was carried out from June 2024 to June 2025. During this time, the researcher visited 6 times to all five conservation centres for three days on each visit. The study adopted purposive and snowball sampling to target participation of those individuals directly implicated in either disturbing or conserving sea turtle nesting processes. Participants included those caught by turtle catching and egg collection, staff from the conservation centres, foreign volunteers, and local community members. Participants were selected carefully to include a broad range of relevant perspectives. The sampling strategy adopted was a purposive one, ensuring that only those with knowledge and experience concerning human-induced threats, natural predators, and conservation measures were included.

Accordingly, seven in-depth interviews, based on a structured set of open-ended questions, were carried out among the staff members of the five different conservation centres and provided the essential information. Further, six semi-structured interviews were carried out among the selected staff assistants of the conservation centres and the neighbouring residents of the conservation centres. In addition, six group discussions were organized with the foreign volunteers and among the local community in order to enrich the data. Snowball sampling was thus used to identify respondents to determine knowledge about incidents regarding sea turtle catching and egg collection. The collection of data involved both direct and indirect questions, some of which aimed at reducing any sort of bias and eliciting more frank responses. Notably, this study may be subject to selection bias as a result of the purposive sampling strategy adopted. It inherently targets those who are directly associated with the conservation activities and, as such, may exclude others who may have something to offer regarding the same. To address this issue, semi-structured interviews were employed during the study to gather diverse views and detailed responses. Secondly, academic articles and other literature related to the study were considered in gathering secondary data to contextualize and compare findings. Most of the data collected had a qualitative nature and included narrative data, personal experiences, and individual perceptions.

The data were analyzed using techniques of content analysis, supported by Microsoft Excel for organizational and coding purposes. Qualitative data were categorized into major themes and subthemes, facilitating interpretation and the presentation of findings. Content analysis allowed the researcher to interpret textual data in a structured manner and identify key patterns relevant to the research objectives.

4. Results and Discussion

Based on the study's objectives, the findings specify that the threats facing the Kosgoda sea turtle site are substantially more significant than the deficiencies in current conservation efforts. Among the five turtle species, green and Olive Ridley turtles are the most common visitors, and both species face serious threats.

According to the analysis, the roughly four-kilometre stretch of Kosgoda Beach has long been recognised by both government authorities, experts, and local communities as a significant coastal habitat for sea turtle nesting. Despite Kosgoda beach's relatively small size, this nesting beach faces considerable threats. The threats identified include human disturbances, predation, pollution, fishing bycatch, boat strikes, and marine debris. Human-induced threats are comparatively more significant than other threats and include the capture of sea turtles, egg collection, illegal trade of sea turtles and their eggs, disturbance to nesting sites, and unsustainable tourism activities.

4.1 Human Threats

Sea turtle poaching: According to the summary of discussions and interviews, approximately 25 to 35 locals are directly involved in sea turtle poaching in Kosgoda alone. The turtles are often caught as they come to the nesting sites by poachers waiting in dark shelters near beaches. Some catch the turtles as soon as they come ashore to nest. Others wait till the turtle start laying its eggs. The most critical issue is that, once the sea turtle starts laying eggs, she cannot stop the process, and she is unable to return to the sea quick enough to avoid human capture. While sea turtles wait offshore in the evening till sunset and use their natural senses to detect lights, sounds, and possible predators and other threats, experienced poachers still manage to catch them easily by responding to predictable nesting behaviour. These poachers are well aware that their activities are illegal, not ethical, and a violation of the existing rules and regulations. However, they continue these activities often for extended periods, mainly because the majority are not engaged in permanent employment. Therefore, sea turtle poaching has become a seasonal source of income for them, mainly during the peak nesting season, that is between November and April. The majority of sea turtles caught by poachers are green and olive ridley turtles. These poachers of sea turtles sell turtles to locals, particularly those who regularly buy them. Besides, they sell them to selected small-scale tourist hotels where turtle-based dishes are served to locals and foreigners. This practice is against the law, but many consumers still feel that turtle meat is nutritious.

Sea turtle egg poaching: According to the findings, egg poaching is very common and represents the most considerable human threat to the sea turtle nesting process in Kosgoda. On average, depending upon species, sea turtles lay about 150 to 300 eggs. Green and Olive Ridley turtles are laying the highest number of eggs in the Kosgoda area compared to other species. A single turtle lays a large number of eggs, often within the same nest, yet the eggs are also not easily broken because of the relative flexibility of the shells. In the high peak nesting and hatching season, recognised from November to April, this especially includes Olive Ridleys' peak from November to January and highly nesting species in Kosgoda, Green Turtles climaxing from February to the end of April. Sea turtles visit the sandy areas of Kosgoda each day for nesting, with an average of 12 - 20 turtles, and the season lasts about 5 to 6 months. About 30 to 40 local individuals from the area were found to be engaged in poaching sea turtle eggs. They typically wait for sea turtles, and once a good nesting site is found, the sea turtles make holes in the sand with their flippers and deposit their eggs in the hole they have dug before covering it with sand and returning to the sea. Shortly after, egg poachers rush to the site and collect all the eggs from the nests. The demand for sea turtle eggs in the region is reportedly very high and from quite a wide range of actors, comprising conservation centres, tourist hotels, residents, and domestic visitors. All five conservation centres merely depend on egg poachers as a source of sea turtle eggs. They purchase these eggs and conduct incubation activities by setting up artificial incubation sites within their centres. Moreover, some small-scale tourist hotels reportedly collect sea turtle eggs from poachers to prepare meals for their clients. Among the residents and domestic visitors, some individuals obtain eggs for personal consumption, whereas others purchase these eggs to sell them to tourists through small boutique businesses operating under different names. The current off-season price of a sea turtle egg ranges from 70 to 90 Sri Lankan rupees, while during the season, with

more eggs available, the price decreases to 30-50 Sri Lankan rupees. However, it is important to note that prices cannot be standardized since they are subject to various negotiations between different sellers and buyers. Such targeted and continued gathering of eggs from endangered and vulnerable sea turtle species may have severe impacts on the loss of genetic diversity and gene flow. Such practices, over time, may lead to a reduction in the population and hinder the long-term survival of these species. Staff at the conservation centres and some locals say that the visits by sea turtles in the area seem to decline gradually. It is considered to be related to the reduced availability of suitable ecological niches in the area.

Nesting site Disturbance: In the recent past, Kosgoda beach has become very attractive to tourists because of its proximity to two of the most beautiful touristic areas in the country, namely Bentota and Hikkaduwa, in addition to its famous sea turtle nesting site. Within a two-kilometre radius from the beach, there are many restaurants, small-scale touristic hotels, cabanas, and boutiques. In particular, most of these touristic businesses operate till midnight and even till 01.00 am, accompanied by elaborate decorative lighting set-ups comprised of bright and colourful lights. All these lightings cause immense disturbances to sea turtles and their nesting abilities. Additionally, all these businesses cause changes to the natural composition of sand in that area, further making it less favourable to sea turtle nesting.

Bycatch of sea turtles: Fishing is also one of the basic livelihoods of people in the neighbourhood of Kosgoda. However, it has been found in the study site that sea turtles are often caught in fishing equipment and even caught accidentally in fishing nets; in most cases, it results in mortal wounds to the turtles that continue to suffer for several years. Incidental bycatch of sea turtles in various fisheries along the northwestern, western and southwestern coast of Sri Lanka has been reported (Kapurusinghe & Saman, 2001, cited Rajakaruna, Dissanayake, Ekanayake and Ranawana, 2009) [21]. An average of 16 to 25 turtles become victims of mortality due to the mess in fishing nets annually during the peak nesting season in the study site. Additionally, damage due to boat collision is also identified as a threat to the female sea turtles as well as hatchlings.

Beach Pollution: Oil spills from fishing boats, coupled with the disposal of waste such as styrofoam used in fishing activities, pose a significant disruption to the sea turtle habitat. Further, the disposal of plastic waste, polythene bags, and other forms of waste by tourists and fishing groups poses a great danger to breeding females and hatchlings. In fact, it has often been identified that sea turtles tend to consume brightly colored plastic pieces and blue and green polythene bags, often termed as “shopping bags” in Sri Lanka, which resemble their prey in appearance. This often results in obstructed gastrointestinal tracts, infections, and eventually death.

4.2 Natural Predation

Through the analysis, natural predation was found to be a source of danger for sea turtles. Regarding natural predators, dogs have been recorded to attack nesting turtles at night. In the Kosgoda coastline area alone, there have been over 20 stray street dogs that search for eggs, baby sea turtles, and adult sea turtles either during the daytime or at night. Apart from dogs, crows have also been a source of danger for baby sea turtles during the daytime. At times, water monitors have also been recorded to be in the area preying upon eggs, baby sea turtles, and occasionally juvenile sea turtles. In Kosgoda, ghost crabs (*Ocypode spp*.) have also been observed as a natural predator of sea turtles, including hatchlings and at times eggs. These particular crabs can be found abundantly in nesting sites and tend to be active during nighttime, and primarily correspond with the timing when hatchlings tend to go out to sea. Owing to their size and speed, hatchlings tend to be an easy target for ghost crabs, particularly when the rate of breeding is at a peak.

4.3 Drawbacks in Sea Turtle Conservation Centres:

According to the findings, several shortcomings were found in sea turtle conservation practices by the centres at Kosgoda including daytime release of hatchlings, unsanitary water tanks, holding hatchlings in small and confined enclosures and tanks, critically low water levels in tanks, veterinary care, and access to necessary overall healthcare supplies. One of the major but largely overlooked threats to sea turtles is the harmful practice performed by some conservation centres in the name of conservation of the species. This happens when the centres purchase the eggs of the sea turtles that have been poached from the natural nesting sites. The eggs are immediately put into an incubated environment in the centres, where they are left for a period of 60 days, after which the hatchlings are produced. The hatchlings are kept in a tank with a size of about 3 feet by 3 feet with a depth of 4 feet, in which 3 feet of the tank is filled with water, targeting to release.

Figure 2: Artificial incubation site at Galbokka conservation centre in Kosgoda.
Source: Researcher, 2025.

Daytime release of hatchlings: four centres out of five were found to allow the public to release hatchlings to the sea during the day for a fee. This is of grave concern, as hatchlings released in daytime are vulnerable to bird predation, with many caught within hours. The hatchlings should only be released at shade hours or in the darkness of the night so that they are assisted in locating their way through the reflections of the moonlight, which helps them to reach the sea. Small in size with weak swimming capabilities, they are neither in a position to swim deeper into the sea quickly

nor escape predators easily in case the predators encounter them when swimming to deeper seas in search of food. In addition, tourists are also allowed to touch turtles and hatchlings for photographs or to handle them for personal interaction in two centres; this is a fundamental breach of conservation ethics and will heighten the chances of injury and infection. The risk of hatchlings being dropped onto hard surfaces is also very high during these events.

Unsanitary and inadequate water tanks: All five of the centres kept the hatchlings in water tanks that could potentially stress them. The unsanitary water tanks were found in three of the centres and could pose a great risk to the welfare of both turtles and hatchlings.

Figure 3: Unsanitary water tanks.
Source: Researcher, 2025.

Similarly, two of these centres held turtles in tanks that lacked adequate water levels which could adversely affect their overall well-being.

Figure 4: Inadequate water in tanks.
Source: Researcher, 2025.

Mr. Fernando, nearly 36 years old involving sea turtle conservation since his childhood in the 'Marine Turtle Conservation Centre', stated as follows:

> "*The hatchery is about 350 meters away from the shoreline, and the filling of the water into all tanks usually takes close to five hours if the pumping system is on full force. Even though the motorised water pump was installed, the iron engine often malfunctions. Consequently, the present pump is non-functional, implying the filling of the hatchery was usually done manually and daily transportation of seawater in about 40 to 50-gallon containers using bicycles*".

Inadequate veterinary care: Based on the findings, another major limitation of all the centres is the lack of adequate veterinary care and the use of appropriate medicines, especially when it comes to treating injured sea turtles. Injuries are mainly caused by fishing nets and strikes from boats. In addition, various diseases have been some of the common causes that require medical attention for rescued turtles. Almost all the centres have limited capacity to provide proper care and rehabilitation for adult turtles and hatchlings. A deficiency of knowledge regarding hatchery management and hatchling care was also identified.

Considering the findings, if Kosgoda Beach were declared and managed as an In-Situ conservation site by the government, many of the threats to sea turtles in this area would be greatly reduced, and indeed the shortcomings of the Kosgoda private conservation centres. This would introduce more sustainable and ecologically viable conservation monitoring, as well as hatchery-based conservation efforts. Additionally, the importance of the Kosgoda area extends to the conservation of regional sea turtles, as it is one of the major breeding grounds.

5. Conclusion

Kosgoda Beach remains one of Sri Lanka's most vital nesting grounds for marine turtles, yet mounting human pressure and gaps in hatchery management threaten its ecological stability. The study shows that egg poaching, tourism-related disturbance, and bycatch are persistent challenges, while certain ex-situ practices may unintentionally undermine long-term conservation goals. Strengthening in-situ habitat protection under state oversight, improving ethical standards in hatchery operations, and reducing light and pollution impacts are necessary steps. Sustained collaboration among conservation authorities, local communities, and tourism stakeholders will determine whether Kosgoda can continue to function as a viable nesting refuge in the years ahead.

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