A PRELIMINARY STUDY OF POPULATION DYNAMICS OF GREEN TURTLES (*Chelonia mydas)* OF SIPADAN, MALAYSIA

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ABSTRACT. *A study was conducted to observe the population dynamics of residential green turtles, Chelonia mydas in Sipadan Island located off the east coast of Sabah, Malaysia. Three field trips (3 days in each trip) were conducted from August till December 2010. Green turtles were caught from 10 selected dive sites, and were brought into upon the boat for morphometric measurements and tagging using inconel tags from Sabah Parks. At the end of this study, 147 individuals with a mean straight carapace length (SCL) of 652.9 (± 124.2) mm were caught. From the results, 77 individuals were juveniles, 28 were sub-adults, and 42 were adults with mean straight carapace lengths of 557.7 (± 70.5) mm, 690.2 (± 40.7) mm, and 802.8 (± 60.6) mm, respectively. During this study, 20 adult female and 22 adult male were caught with mean straight carapace lengths of 811.1 (±59.2) mm and 795.1 (±62.6), respectively. In our study area, juvenile green turtles were the most abundant as compared to sub-adults and adults. This finding is fundamental in estimating the population of resident green turtles in Sipadan Island and also contributes to better management and conservation of this marine protected area*.

KEYWORDS. Green turtles, *Chelonia mydas*, population dynamics, Sipadan Island, Malaysia

INTRODUCTION

Located off the east coast of Sabah, Sipadan Island is the only oceanic island in Malaysia that rises 600 meters from the seabed (Figure 1). Sipadan Island is blessed to have rich and high biodiversity of Marine ecosystems which included coral reefs, extensive seagrass beds. Apart of being among the top dive spot in the world, Sipadan Island also attracted many scientists to conduct related research.

High biodiversity of coral reefs in Sipadan had benefits the tourism industry which indirectly contributed to state source of income. One of the major attractions in Sipadan Island other than various species of corals, sponges, schools of barracuda, bumphead parrotfish, various species of reef fish, and sharks, is sea turtle.

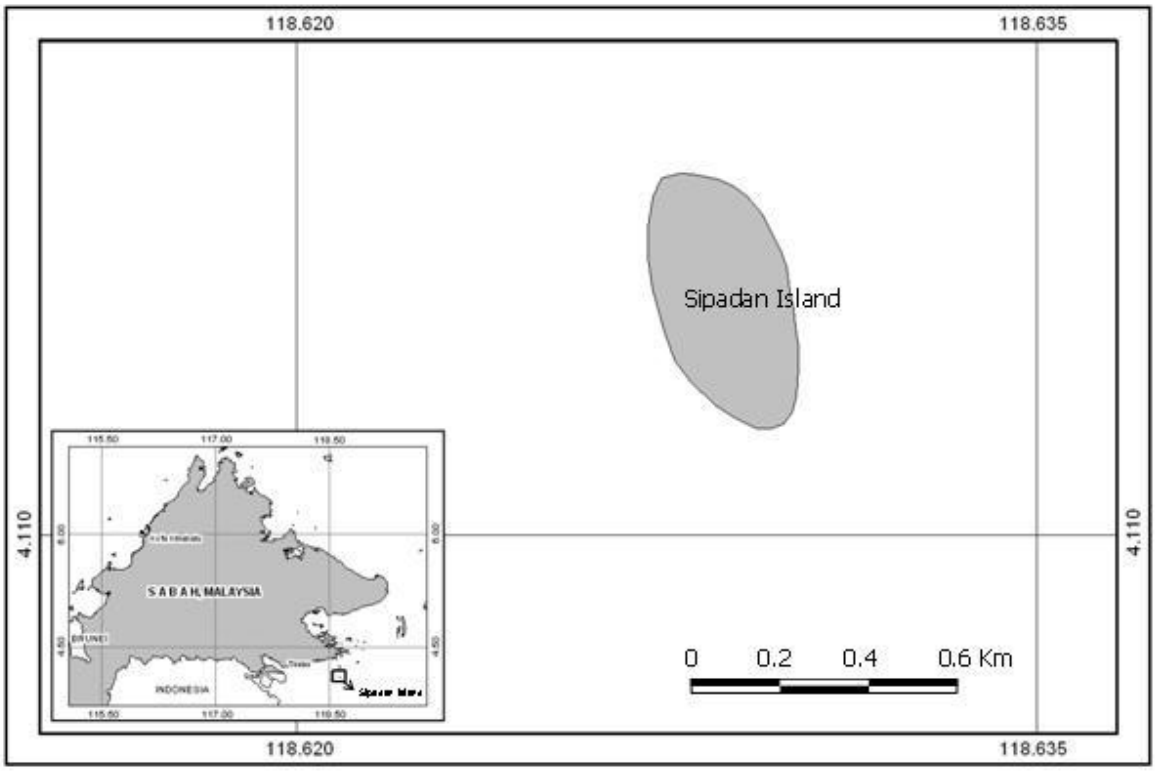

Figure 1. Map of Sipadan Island, Sabah, Malaysia.

There are seven species of sea turtles in the world where four can be found in Malaysia and among them two species are green (*Chelonia mydas*) and hawksbill turtles (*Eretmochelys imbricata*) which can be found in Sipadan Island (Mortimer, 1991). The green turtle, *Chelonia mydas* is the most common sea turtle in Borneo and West Malaysia (Lim and Das, 1999; Isnain, 2008) and the most abundance species in Sipadan Island (Mortimer, 1991). The World Conservation Union (IUCN) had recognized green turtle as endangered species, and listed under Appendix I of CITES (Convention on International Trade Endangered Species of Wild Fauna and Flora); and Appendices I and II of the Convention on Migratory Species (CMS) (Seminoff, 2004). In Sabah, green turtle is protected under Wildlife Conservation Enactment 1997, Schedule I Section II, Totally Protected Species of Animals and Plants, Part I (Section 25 (2)) (Yap, 1997). The green turtle's feeding habits vary regionally and may include marine algae and seagrass as the primary diet (Pritchard, 1971; Balazs, 1980; Bjorndal, 1991; Seminoff *et al*. 2002). There are five species of seagrass that heve been reported in Sipadan Island which are *Thalassia* hemprochii, *Halophila, ovalis, Haloduke uninervis,* and *Cymodocea rotundata.* The green turtle, *Chelonia mydas,*was reported in Fuentes *et al.* (2006) as seagrass consumer with high preferences on *Thalassia* sp.

Regarding the extensive seagrass meadow in Sipadan, green turtles (*Chelonia mydas*) commonly seen to feed on seagrasses when the tide is high. When the tide is low, they are always seen in shallow reef areas, either resting or swimming.

In Sipadan Island, green turtles have been reported to nest all year round with peak months between July and December (Mortimer 1991). The objective of this study is to observe the population dynamics of green turtle (*Chelonia mydas*) in Sipadan Island which is one of the major attractions to the place.

MATERIALS AND METHODS

Three field trips (3 days each) were conducted from August to December 2010 in ten selected dive sites (Figure 2) in Sipadan Island which are Lobster Lair, Mid Reef, Drop Off, Turtle Patch, Staghorn Crest, Hanging Garden, White Tip Avenue, Barracuda Point, Coral Garden, and Turtle Cave. Green turtles were caught while SCUBA diving, and were brought upon the boat for morphometric measurements. The turtles were tagged on both front flippers using inconel tags from Sabah Parks. Finally, before the turtle were released back into the water, white marker is used to mark the carapace so that the divers will not approach the same turtle. This would save time and reduce the probability of catching the same turtle during the same trip.

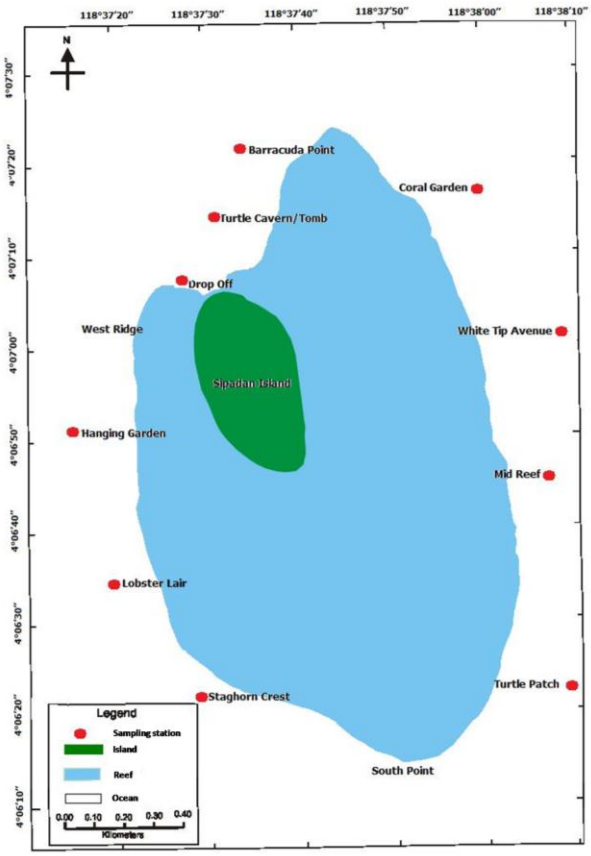

Figure 2. Map of dive sites in Sipadan Island.

RESULTS AND DISCUSSION

A total of 147 green turtles were caught during this study with a mean straight carapace length (SCL) of 652.9 (±124.2) mm. From the results, 77 individuals were juveniles, 19% were sub-adults and 29% were adults with mean straight carapace lengths of 557.7 (±70.5) mm, 690.2 (±40.7) mm, and 802.8 (±60.6) mm, respectively. During this study, 20 adult female and 22 adult male turtles were caught with mean straight carapace lengths of 811.1 (±59.2) mm and 795.1 (±62.6) mm, respectively.

Mortimer (1991) has reported 98 individuals of green turtles in seven selected sites (North Point to Jetty, Jetty to Barracuda Point, White Tip Avenue, Turtle Patch, South Point to Staghorn Crest, Hanging Garden and West Ridge). From the 98 individuals of green turtle caught, 24% (n=24) individuals were juveniles or sub-adults. The rest of 74 green turtles (75.5%) appeared to be adults, with 64% (n=47) were obviously male. The remaining 27 (36%) individuals may have included some sub-adult male turtles, whose tails had not yet fully developed. The comparison between present results and two decades old results from Mortimer (1991) study of green turtles population dynamics in Sipadan Island is shown as in Table 1.

Table 1. Comparisons of results obtained by Mortimer (1991) and present study (2010).

Year	Adult		Sub-adult (%)	Juvenile (%)	Total of green turtles
	Male (%)	Female (%)			
1991	47 (48)	27 (27.5)	24 (24.5)		98
2010	22(15)	20(14)	28(19)	77 (52)	147

The numbers of adult male turtles observed were highest in both studies. This is because, male turtles usually return to the nesting beach more frequent than the female turtle (Mortimer, 1991). However, the methodology used for the studies also can affect the results. The study in Mortimer (1991) was done by observation through scuba diving while this study involved catching, tagging and marking of the turtles. The probability of sighting the same turtles and overlooking the turtles is higher in Mortimer (1991). The number of juveniles caught in the present study also is higher than in Mortimer (1991). Due to different methodology and time duration, both studies were not sufficient to estimate the population dynamics of green turtles in Sipadan.

This study shows that the juvenile green turtles in Sipadan were the most abundant as compared to sub-adults and adults. However, this is an ongoing study and we hope to complete the census of this turtle population in the near future together with their feeding behavior and short-term growth rate. A long-term study should be done to estimate the population of green turtles in Sipadan at a regular interval.

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