



7.0 SEA TURTLE RESEARCH AND CONSERVATION CONDUCTED BY UNIVERSITI MALAYSIA TERENGGANU

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Long-term sea turtle conservation at Redang Island

Universiti Malaysia Terengganu (UMT) through its Sea Turtle Research Unit (SEATRU) had started the sea turtle research in 1984, when the first research on the leatherback turtles at Rantau Abang was initiated (Chan et al., 1985; Chan, 1989, Chan & Liew 1989). Then in May 1993, the long-term sea turtle conservation project at Chagar Hutang, Redang Island (Fig. 7.1) was initiated to save the declining populations of green and hawksbill turtles (Joseph & Liew, 2010; 2012). This long-term project provides vital information on the population sizes, population fluctuations, study nesting behaviour, and determine nesting sites and relocated nests (Fig. 7.2). Turtles will be double tagged, measured and monitored for scars, injuries and diseases. At the same time, it was very difficult for UMT to run large conservation projects as high amount

of money were needed to buy eggs for incubation. Each nest of green turtle was purchased for RM120 and hawksbill turtle nest for RM150 from the licensed egg collectors. Funds to buy sea turtle eggs for incubation at Redang Island were obtained through donations from Berjaya Group, Terengganu State Government, UDA Holdings and the public.

In 2005, UMT together with the Department of Fisheries Malaysia successfully persuaded the State Government of Terengganu to gazette the major nesting beaches in Redang Island (Chagar Hutang, Mak Simpan & Mak Kepit) as turtle sanctuaries, hence had stopped the collection of eggs for commercial sale. Since then all eggs laid at the three major nesting beaches in Redang Island can be incubated without buying it from the licensed egg collectors. Since the initiation of the conservation program (1993-2015), a total of 10,380 sea turtle nests have been protected through the *in-situ* program

(Fig. 7.3). From these, about 600,000 healthy hatchlings (overall hatching success of 80 – 87%) were released back to the sea to replenish the future sea turtle stock in Redang Island. In 2001, the conservation effort at Chagar Hutang by UMT was recognized by the United Nations Environment

Program (UNEP) when it elected the former project executants to the Global 500 Roll of Honour. Long-term protection of sea turtles and their eggs at nesting beaches resulting in maintaining high hatchling output is shown to be an effective and essential conservation strategy.



Figure 7.1: Aerial view of Chagar Hutang beach, Redang Island, Terengganu

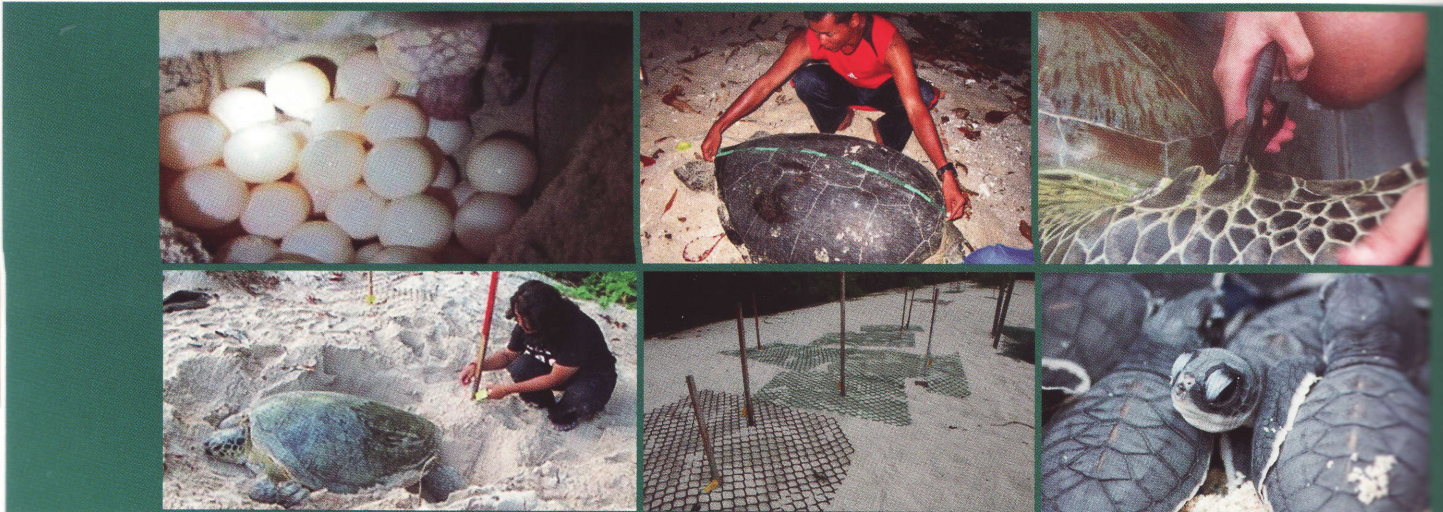


Figure 7.2: Long-term sea turtle monitoring, tagging and *in-situ* egg incubation at Redang Island, Terengganu



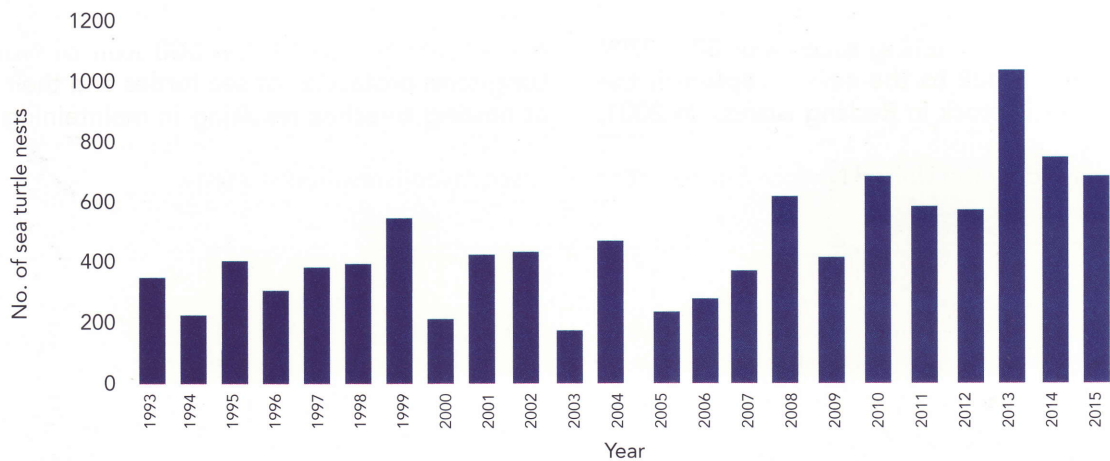


Figure 7.3: Number of sea turtle nests protected by UMT at Chagar Hutang beach, Redang Island from 1993-2015

Sea Turtle Research

Apart from conducting the long-term sea turtle conservation, UMT had pioneered the sea turtle research in Malaysia. In the early years, effort was done to collect data on the reproductive biology of sea turtles on nesting beaches as very limited knowledge was known about these species in Malaysia. A saturation tagging program was initiated at Redang Island since 1993 and since then a complete reproductive data was obtained (Chan & Liew, 1999; Chan 2010). Studies on temperature sex dependent was carried out to determine the sex of hatchlings produced from *in-situ* and *ex-situ* (hatcheries) incubation program throughout Malaysia. It was revealed that up to late 1980s all of the hatchlings produced from the *ex-situ* incubation in Malaysia produced 100% female hatchlings (Chan & Liew, 1995; Chai et al., 1999). Only the *in-situ* incubation program at Redang Island had produced

a balance sex ratio (Palaniappan, 1998). This was because sex of turtle hatchling was determined by temperature. Higher temperature produce females and cooler temperature produce male hatchlings. Through this study, it was recommended that hatcheries in Malaysia must be partly shaded so that it will produce a balance sex ratio. By the late 1990s, all hatcheries in Malaysia were partly shaded to produce a balance sex ratio in the population. Handlings and embryological analyses of eggs were also done to increase the hatching success rate of eggs. Through this study, it was recommended that for *ex-situ* incubation, eggs should be transferred immediately or not more than two hours.

Using biotelemetry techniques, studies on interesting behaviour of sea turtles during their breeding season and migration back to their feeding

grounds were also determined. In each breeding season, female sea turtles will come up to lay eggs within every 10-14 days (Chan, 2010). Attachment of radio and acoustic telemetry to the nesting sea turtles had shown that turtles will remain very near to their nesting beaches, roaming around Redang for about four to five months until they had finish laying their eggs for that season, before returning to their respective foraging grounds (Liew & Chan, 1993). Radio-telemetry attached on the leatherback turtles has enabled the identification of interesting habitats of leatherback turtles in Rantau Abang, resulting in the legal establishment of an offshore sanctuary for these animals (Chan et al., 1991). Un-controlled boat and tourist activities during this breeding period might disturb or endanger the sea turtles. This is where it was suggested that the nesting area should be protected during the breeding season. At the end of the breeding season, green turtles were attached with satellite telemetry to determine their foraging grounds. The green turtles from Redang Island were found to forage at Brunei Bay, Natuna Island, Philippines (Sulu Sea) and Bangka Island, Indonesia (Papi et al., 1995; Luschi et al., 1996). Though only 5 green turtles were attached with satellite transmitter in the study, the findings were very important and prove the long distance migration of the Malaysian green turtles. UMT has also developed a technique to study the offshore movements of newly-emerged turtle hatchlings by miniaturization of radio-telemetry techniques. By following the hatchlings in the sea, we gain an understanding of where these hatchlings go, the currents they follow, where, what and when they feed, and the dangers they face. It is only through

such studies that we can provide accurate estimates of sea turtle survival.

Genetic studies were also conducted to determine the sea turtles mating system, genetic structure and diversity as well as the natal origin of the mixed-stock at foraging grounds (Joseph, 2006; Joseph & Shaw, 2011; Hideaki et al., 2016; Joseph et al., 2016). The vital information resulting from all the studies have formed the basis for many important recommendations made by UMT to relevant government agencies for the conservation of sea turtles in Malaysia. All these research findings contribute to significant impacts on the improvement of sea turtle conservation and management in Malaysia.

Besides carrying out conservation-oriented research on sea turtles, UMT is also directly involved in education of university students at the undergraduate and graduate levels, school children, and the public at large on the conservation of sea turtles. It also undertakes consultancy projects which are directly or indirectly related to sea turtles. In order to support the long term conservation program at Redang Island, UMT had come up with an outreach program, called STOP – Save our Turtles Outreach Program. The main objectives for this program are to create public awareness and to fund the long term sea turtle conservation at Redang Island. STOP comprise of three programs which are Adopt a Turtle/Nest, Sea Turtle Volunteers and Sea turtle Awareness program (Joseph & Liew, 2010).