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Sea Turtle
Biology & Conservation

UNIVERSITI MALAYSIA TERENGGANU

TOPIC 8:
RESEARCH & MANAGEMENT OF SEA TURTLE FOR CONSERVATION

By:

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Topic Outline

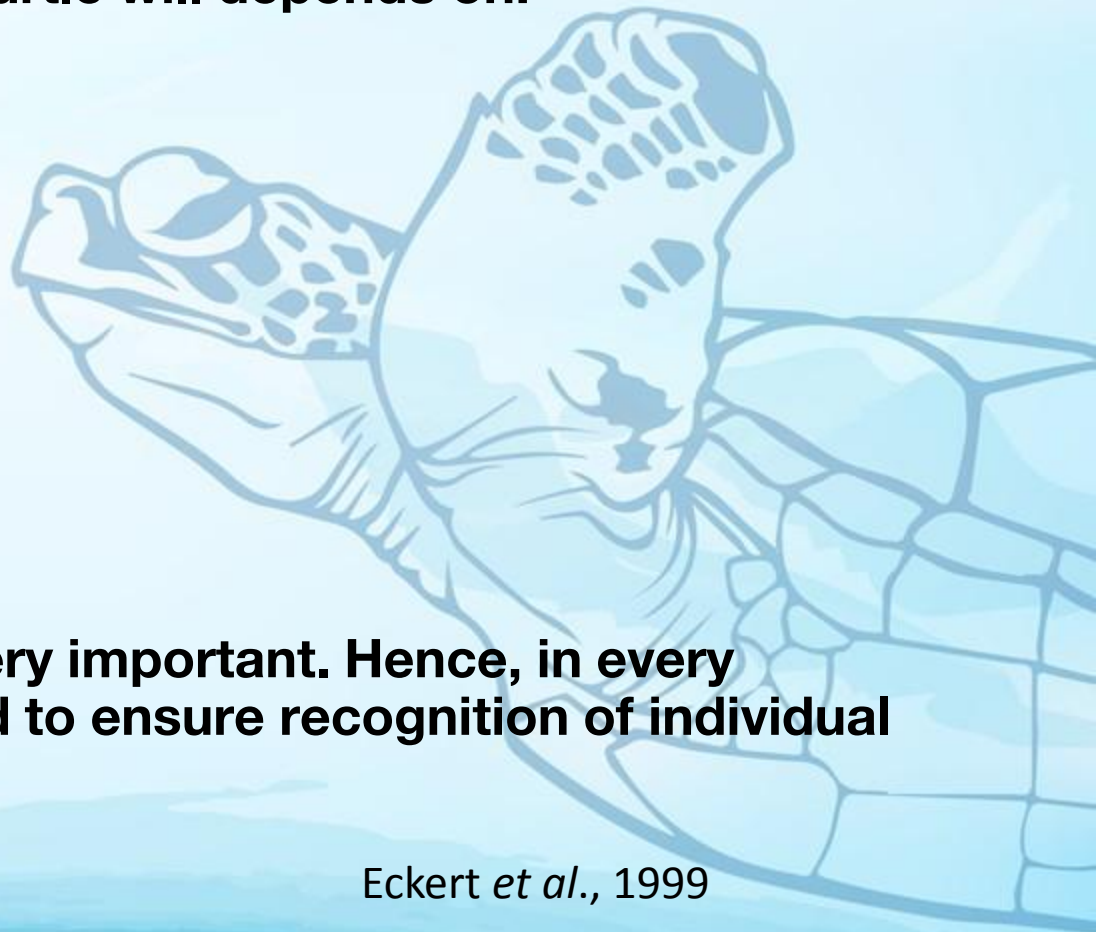
- Tagging and monitoring of sea turtles
- Overview of sea turtles conservation in Malaysia
- Sea turtle research, conservation and outreach programme by Universiti Malaysia Terengganu

Tagging and Monitoring of Sea Turtles

- In one of the earliest attempts to understand sea turtle life history, researchers applied metal tags to the flippers of nesting females. Tag/recapture studies were highly successful and subsequently became a standard technique for sea turtle research.
- Sea turtles are tagged to achieve the recognition of individuals or cohorts for research purposes. Tagging is most often conducted to obtain information on reproductive biology, movements, stranding, residency and growth rates.
- Historically, tagging has been the single-most valuable activity in advancing our understanding of sea turtles and their conservation needs in relation to complex life cycles, reproductive migrations, slow growth rates (for some species), and delayed sexual maturation.

Tagging and Monitoring of Sea Turtles

- **Tag retention and maintaining recognition of a turtle will depends on:**
  - **type of tag used**
  - **where and how it is applied on the turtle**
  - **turtle species and size class tagged**
  - **skill of the person doing the tagging**
  - **condition of tagging gear**
  - **the number of tags applied to each turtle**



- **The length of time the tag stay on the turtle is very important. Hence, in every tagging program the tag loss must be minimized to ensure recognition of individual turtle.**

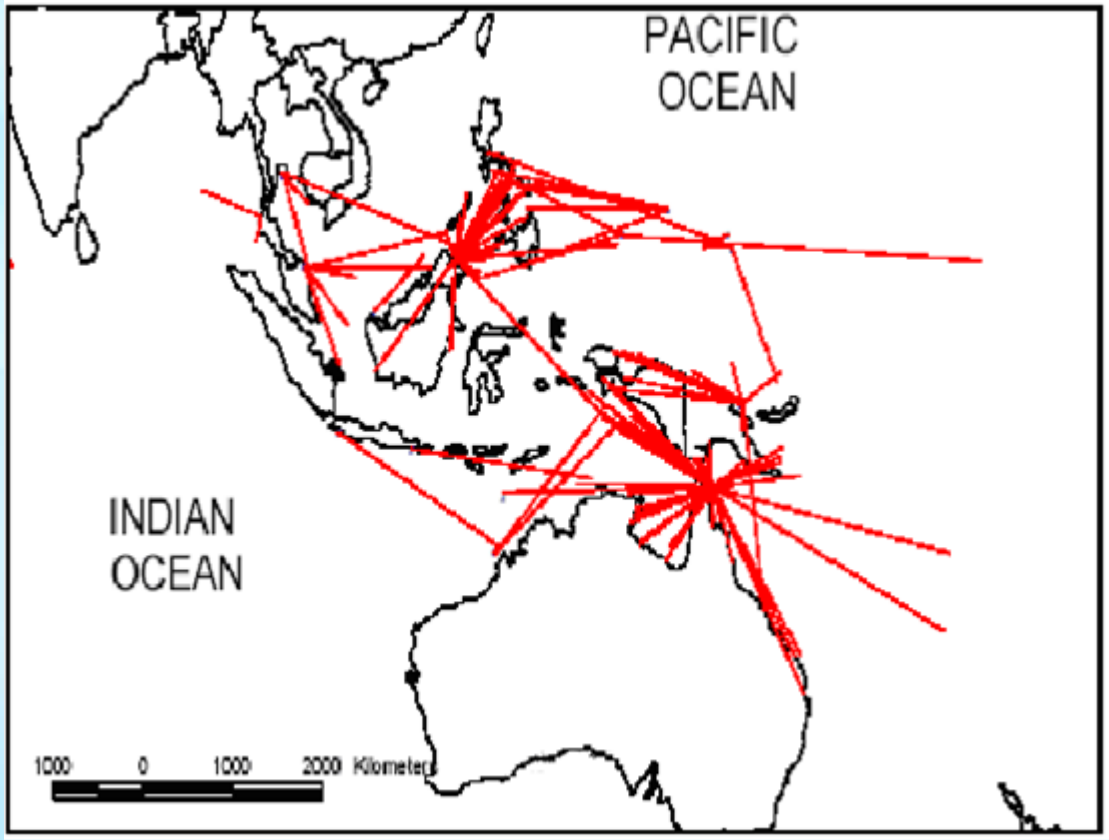
Eckert *et al*., 1999

Importance of tagging sea turtles

- To give individual identification:

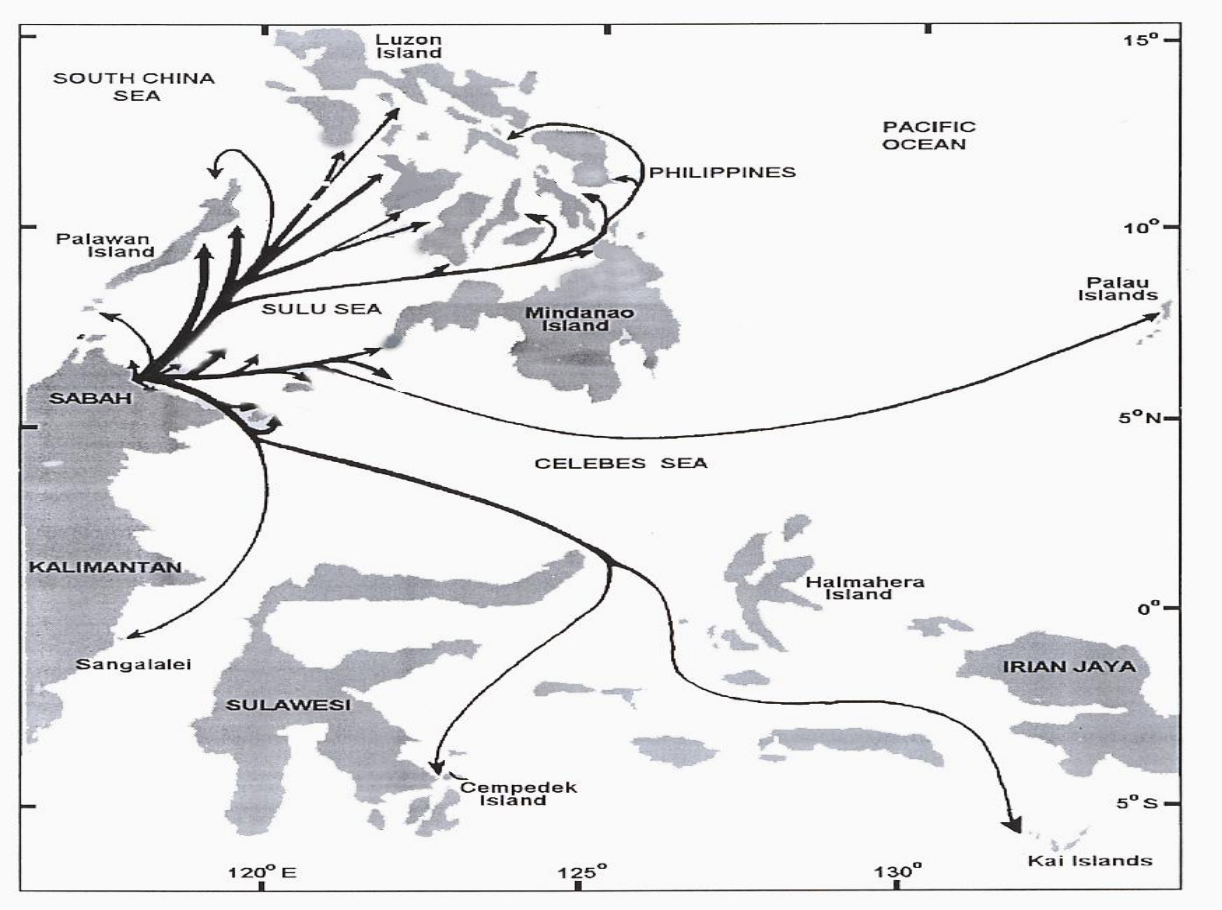
- Migration and geographical ranges
- How often and how accurately a female returns to her nesting beach
- How often and how many eggs she lays in a season
- Growth rate
- Location of their foraging grounds
- Stranding, incidental capture

Tagging and Monitoring of Sea Turtles



Linkage between feeding and nesting areas for green turtles in Southeast Asia-western Pacific region. Lines link tagging and recapture sites for individual turtles and are not intended to portray individual migratory paths (from Moritz *et al.*, 2002)

Tagging and Monitoring of Sea Turtles



Recapture locations of green turtles tagged after completion of nesting in Sabah Turtle Islands Park, Malaysia between 1972 to 1994 (De Silva, 1996). Routes do not denote actual migratory pathways

Types of tags:

External Tags:

- Plastic Tag
- Monel Tag
- Titanium Tag
- Inconel Tag

Internal Tags:

- PIT Tag (Passive Integrated Transponder Tag)

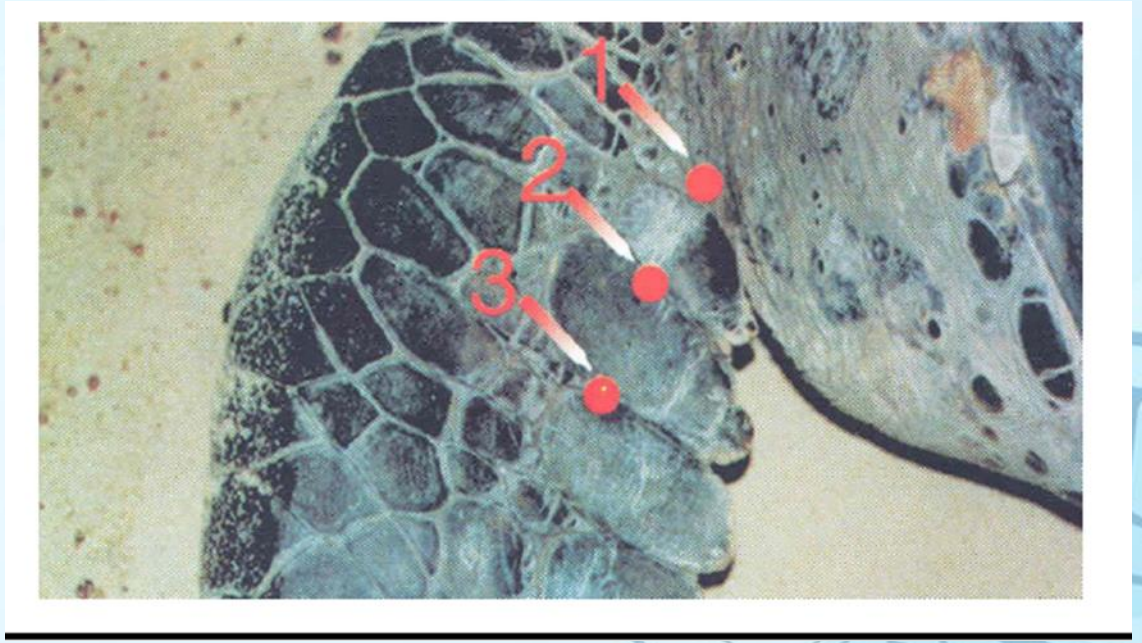
Externally Applied Tags:

- The most commonly used in sea turtles are made of metal or plastic attach to the posterior edge of the flipper.
- Plastic tag: consist of two pieces that require special applicator to snap the sides together.
- Metal Flipper tags: Metal tags commonly used on sea turtles are made of pure titanium or blends of metals known as alloys that have enhanced physical characteristics (eg. Monel and Inconel). Metal tags require a special applicator for proper attachment. Titanium and Inconel are equivalent in their superior resistance to corrosion in sea water. Tags for these metals are recommended.

Where to tag:

- Hard-shelled turtles:- Two tags, one in the trailing edge of each front flipper. Double-tagging - increases the likelihood that a turtle will retain her unique identification over several years.

- Tags can be applied in the scale proximal to (closest to) the body of the turtle on both the left and the right front flippers.



Internal Tags: Pit Tags

- Passive integrated transponder (PIT) tags are small inert microprocessors sealed in glass that can transmit a unique ID to a hand-held reader.
- PIT tags used on sea turtles range in size from 11.5x2.1mm to 20.0 x 3.2 mm.
- PIT tags are inserted into the shoulder muscle of sea turtles or under the scale or between the digits of a front/hind flipper.
- PIT tags are a new innovation in sea turtle research. However, it is very costly.

Why do we measure sea turtles?

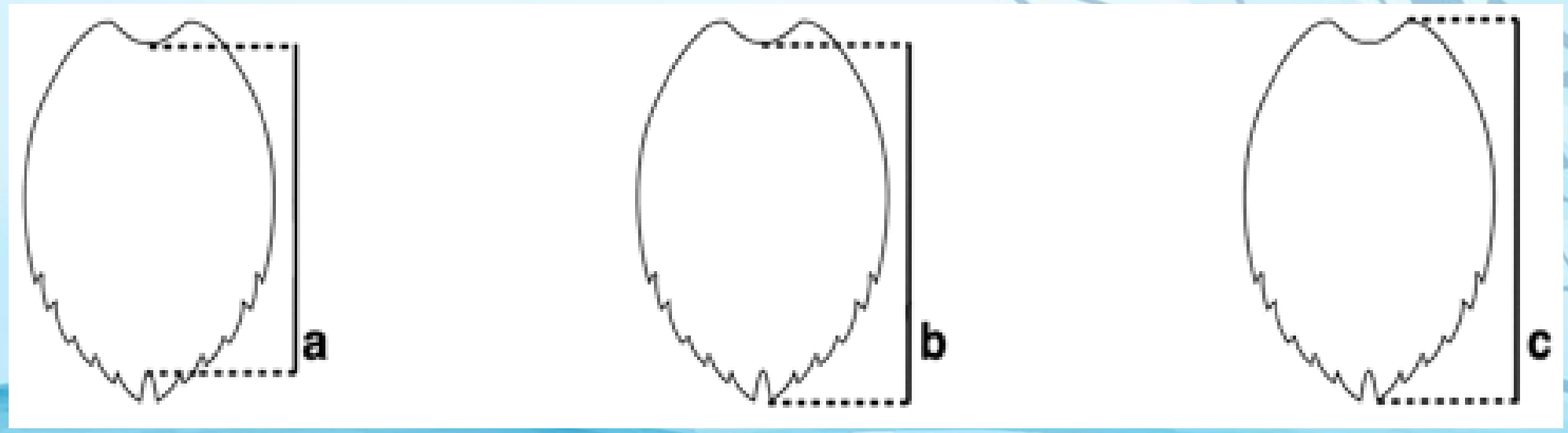
- To monitor nesting female size
- To relate body size to reproductive output
- To determine size frequency (juvenile, subadult, adult)
- To determine growth rate

Measuring techniques (Length)

The anterior and posterior pairs of anatomical points for three carapace length measurements:

a. Minimum Straight Carapace Length (SCL) or Curved Carapace Length (CCL)
b. SCL or CCL notch to tip
c. Maximum SCL or CCL (Nuchal scute to tip)

*straight measurements = using calipers
* Curved measurements = using flexible measuring tape



Measuring techniques (Width)

- Width is measured at the widest point of the carapace
- Straight Carapace Width (SCW): measured with calipers
- Curved Carapace Width (CCW): Measured using a flexible measuring tape

Overview of Sea Turtle Conservation in Malaysia

- Malaysia has a long history of conserving sea turtles, dating back to the 1950's. Even so, the number of sea turtles had decline drastically. The major threats include a continuous over-exploitation of eggs and adults (as by-catch in trawl fisheries), habitat loss, environmental degradation, direct human disturbances and pollution. The threatening processes continue and the problems seem unresolved, despite various conservation efforts such as legislation, operation of beach hatcheries and establishment of sanctuaries.
- In the early years, the government had little success with turtle conservation, and turtle habitats as these are not high on their list of priorities. Commitments made have failed to curb the declines, leading to the local loss of these endangered species.
- Poor management practices and incomplete knowledge of the turtle's biology and ecology in this area have also lead to the decline of sea turtles in Malaysia. The lack of knowledge has hindered efforts to develop effective conservation measures. The permanent loss of the leatherback turtle is often cited as a classic example of population crash. The other sea turtle species struggle to survive due to continued exploitation and anthropogenic threats. Currently, only the green turtle continues to nest in significant, though much reduced, numbers in Malaysia.

Overview of Sea Turtle Conservation in Malaysia

- However, the last 20 years or so have witnessed an increase in scientific knowledge on sea turtle in Malaysia.
- The current conservation measure of sea turtles and their eggs at nesting beaches in Malaysia has resulted in high hatchling output. Some populations are showing signs of recovery as more awareness, protection and conservation efforts were implemented.
- However, commercial selling of sea turtle eggs is still permitted in some states, as there is no uniformity in the legislation. Attempts to standardise legislation is ongoing, though progress is slow.
- Harvesting of sea turtles at their foraging habitats is also in a worrying state and greater regional cooperation between nations towards protecting sea turtles in their foraging grounds have made some progress. To fully protect and conserve sea turtles, we need to protect them not only at the nesting beaches but also in their foraging grounds or other habitat during their life cycle.

Conservation Effort in Peninsular Malaysia

- The first hatchery in Peninsular Malaysia was built at Rantau Abang, Terengganu in 1971. All sea turtle eggs were transferred to the hatchery to avoid eggs being stolen by poachers.
- In Malaysia, all sea turtle eggs are transferred to a protected hatchery to avoid eggs from being stolen. Only Chagar Hutang and Mak Kepit beach at Redang Island, Terengganu conduct an *in-situ* egg incubation.
- Currently, there are six Turtle Information and Conservation Centers established in Peninsular Malaysia (Terengganu -2, Pahang -1, Melaka – 1, Perak -1 and Penang - 1). Conservation of sea turtles in Peninsular Malaysia is a joint effort with various government agencies, university, NGOs and private sectors.
- The conservation effort in Peninsular Malaysia had shown positive results especially for the green turtle populations. However other species of sea turtles are still decreasing. Sadly the leatherback turtle is now considered extinct in Peninsular Malaysia.

Conservation Effort in Sabah

- Turtle conservation in Sabah started in 1927 by the North Borneo British Company. In 1977, the state government approved the establishment of Turtle Islands Parks which formerly known as Turtle Farm that consist of three important islands, namely Selingaan (8.1 ha), Bakkungan Kechil (8.5 ha) and Gulisaan (1.6 ha). With the establishment of the park, turtles and their nesting beaches are fully protected. A total of 263,036 nests were recorded from 1979 to 2014, and 94% of the nesting were green turtle. The nesting pattern of green turtles had increased since 1991.

- The establishment of Turtle Islands Park, Sipadan Island Park and Tun Sakaran Marine Park give a full protection and recoveries of the exploited nesting and foraging grounds of sea turtles in Sabah.
- Since the park's establishment, nests monitoring have been initiated, while tagging program has started since 1970 thus had made the park's nesting data collections among the longest in Malaysia.

Isnain *et al.*, 2016

Conservation Effort in Sarawak

- The sea turtle conservation effort in Sarawak started in 1951.
- In 1957, the Sarawak Government gazzete the Turtle Trust Ordinance 1957 and formed the Turtle Board to control the 'turtle industry' in Sarawak Turtle Islands.
- The management and research on marine turtle of Sarawak changed with the gazettement of the Wild Life Protection Ordinance,1988 (WLPO) and Sarawak Biodiversity Council Ordinance, 1998 (SDC). All species of Chelonidae and Dermochelyidae were listed as Totally Protected Animal, under the WLPO.
- A number of strategies and measures have been undertaken to ensure the increase of sea turtle population. Legislations (rules and ordinances) pertaining marine turtle in Sarawak have been revised or amended many time since 1957 to suit the needs and better protection of the species. Management authority on marine turtles also changes according to ordinances and state policies.
- Since 1999, no turtle eggs from Sarawak Turtle Islands was sold to public by the Turtle Board, but bought and incubated for conservation.
- Recently, the Sarawak State Government gazette the Sarawak Turtle Islands as Talang-Satang National Park to protect the critical habitat of marine turtles. Through this gazettement the protection of water bodies has extended to 4.8 km radius from the highest point of each of the islands. Other nesting beaches are also protected such as Tanjung Datu National Park, Similajau National Park and Samunsam Wildlife Sanctuary.

Bali, 2016

Sea Turtle Research, Conservation and Outreach Programme conducted by Universiti Malaysia Terengganu

- 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 at Chagar Hutang, Redang Island was initiated to save the declining populations of green and hawksbill turtles. This long-term project provide basic, yet vital information on the population sizes, monitor yearly population fluctuations, study reproductive and nesting behaviour, and determine the success of '*in-situ*' and relocated nests
- At the early years, it was very difficult for UMT to run the sea turtle 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 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.

The General Layout of Redang Island

Chagar Hutang:

(UMT)

Mak Kepit & Mak Simpan:

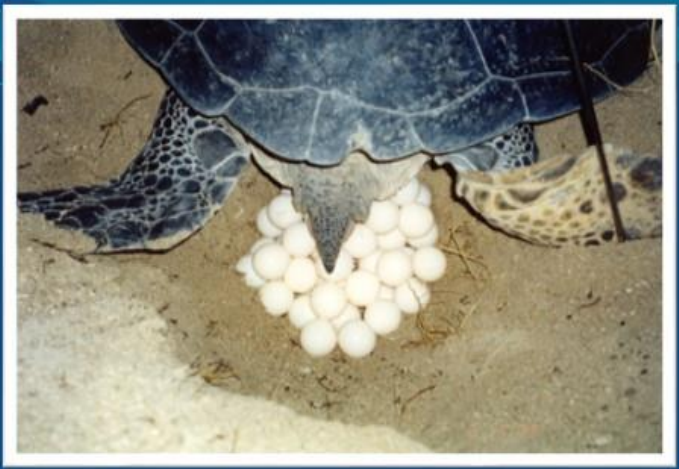
(DoF)

Map of Redang Island showing the location of Turtle Sanctuaries

1. **Long-term tagging, monitoring of nesting sea turtles and *in-situ* egg incubation:**

Redang Island:

- Serve as nesting grounds
- Mating areas
- Foraging grounds



SEATRU PROGRAM

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CONSERVATION

- Long-term sea turtle monitoring, tagging and *in-situ* egg incubation (1993 – present)
- 10,380 nests were protected
- >700,000 hatchlings produced

RESEARCH

- Tagging & Monitoring Sea Turtle Population
- Hatching success and predation of eggs & hatchlings
- Genetics study
- Bio-acoustic study
- Photo-ID
- Hatchling lost years

TEACHING & LEARNING

- Field work for undergraduate and postgraduate courses
- FYP and Graduate thesis
- Student internship

OUTREACH

- Volunteer Program (April – October; since 1998)
- Nest/Turtle Adoption (throughout the year)
- Turtle Camps (for the school kids at Redang; since 1996)
- Visits to the Turtle Sanctuary
- Exhibitions & Talks

Sea Turtle Research, Conservation and Outreach Programme conducted by Universiti Malaysia Terengganu

- In recent years, sea turtle research in UMT has developed into a multi-disciplinary program aimed at studying all aspects of the biology and ecology of sea turtles, threats to their survival, and how they can be managed in order to restore the various species to a stable population level.
- The vital information resulting from these studies have formed the basis for many important recommendations made by UMT to relevant government agencies for the conservation of sea turtles, especially within the state of Terengganu.

- Two types of research conducted by the Sea Turtle Research Unit (SEATRU), UMT:

1. Long-term tagging, monitoring of nesting sea turtles and *in-situ* egg incubation at Chagar Hutang
2. Research on the biology, ecology, threats and restoration of sea turtles

1. Long-term tagging, monitoring of nesting sea turtles and *in-situ* egg incubation:

- This is the main research conducted by SEATRU. It was initiated since 1993, and it is still an on-going research, aimed to collect biological data of sea turtles, to monitor and protect the population of sea turtles at Redang Island and to protect eggs under incubation at Chagar Hutang beach from poachers and other predators, and as well as to increase the hatch success of hatchlings.
- All sea turtles that nest at Chagar Hutang will be double tagged with Inconel, measured and checked for any injuries. Besides tagging sea turtles using inconel tags, SEATRU scientists also explore the possibility of using photo-identification technique.
- All nest are incubated *in-situ*. After two months, nest will be excavated to determine the hatching success.
- Since the initiation of the project (1993 – 2015), a total of 10,380 sea turtle nests have been protected through the *in-situ* program. From these more than 700,000 hatchlings were released to the ocean. Since sea turtles will only reach maturity at the age of 25 to 50 years, it is too early for us to determine whether the conservation work conducted is successful. A massive increase of more than 1000 nesting at Chagar Hutang recorded in 2013 and 2016 was an early indication that the sea turtles nesting at Redang Island had increased and this is a positive indication from the long-term conservation effort conducted by UMT.

- In 2001, the conservation efforts at Chagar Hutang had been recognised by the United Nations Environment Program (UNEP) when it elected the former project executants to the Global 500 Roll of Honour.

Long-term Tagging and Monitoring of Sea Turtles in Chagar Hutang (1993-present)

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Excavation and analysis of unhatched eggs

Hatchling emergence

Nest excavation

Examining the contents of un-hatched eggs

Natural predators of sea turtle eggs and hatchlings at Chagar Hutang beach:

Ghost crabs

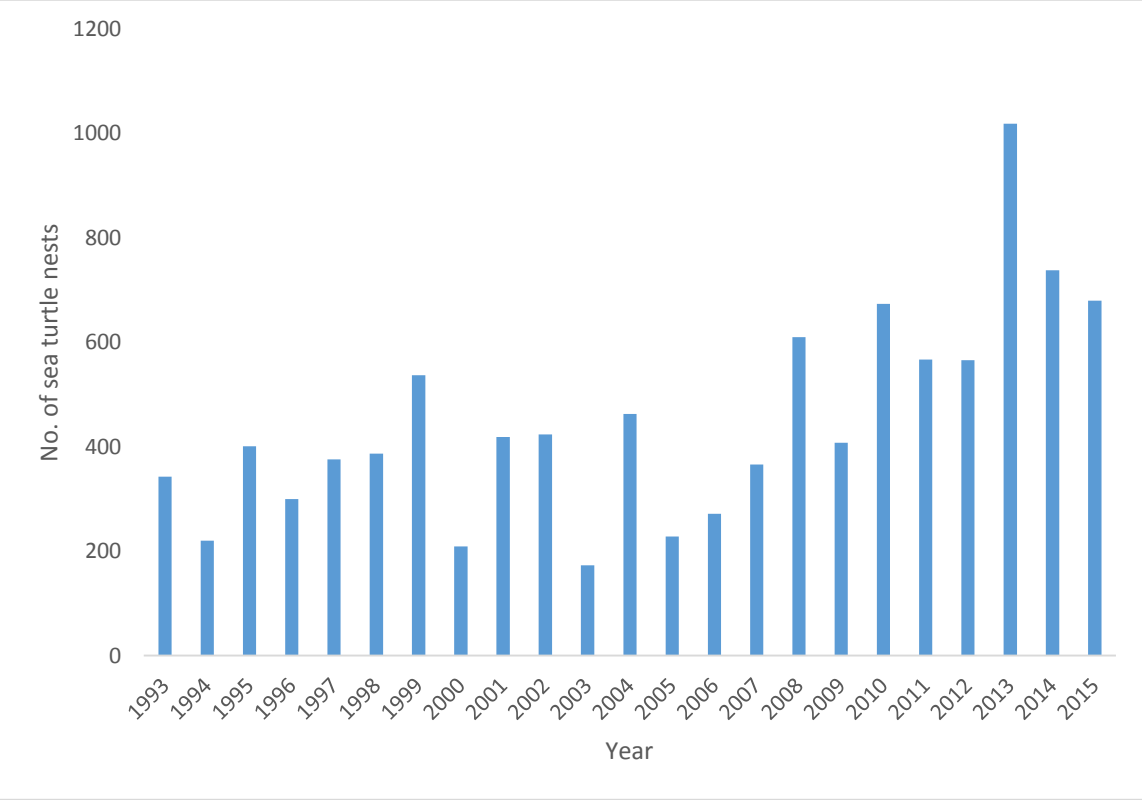
Monitor lizards

Fire ants

Fungus

Hatching Success:
73 – 86%

Nest recorded at Chagar Hutang



- Nest Protected:10,380
- No. of turtle tagged: 2311
- 1993 – 2004: only 77% of eggs were incubated
- 2005: Gazette as Turtle Sanctuary (100% eggs incubated)

- Two species of sea turtles: Green turtle & Hawksbill turtle
- Nesting occurred throughout the year, but during the northeast monsoon (Nov – Jan) monitoring sometimes could not be done due to rough weather.
- Peak nesting months: May to July

After more than 20 years of conservation effort, the sea turtle populations had increased in Redang Island

Long term protection is tedious, but maintaining high hatchlings output is shown to be an effective and essential conservation strategy.

Conservation must be sustained for a long time.

- **Funding**
- **Field assistants**

2. Research on the biology, ecology, threats and restoration of sea turtles

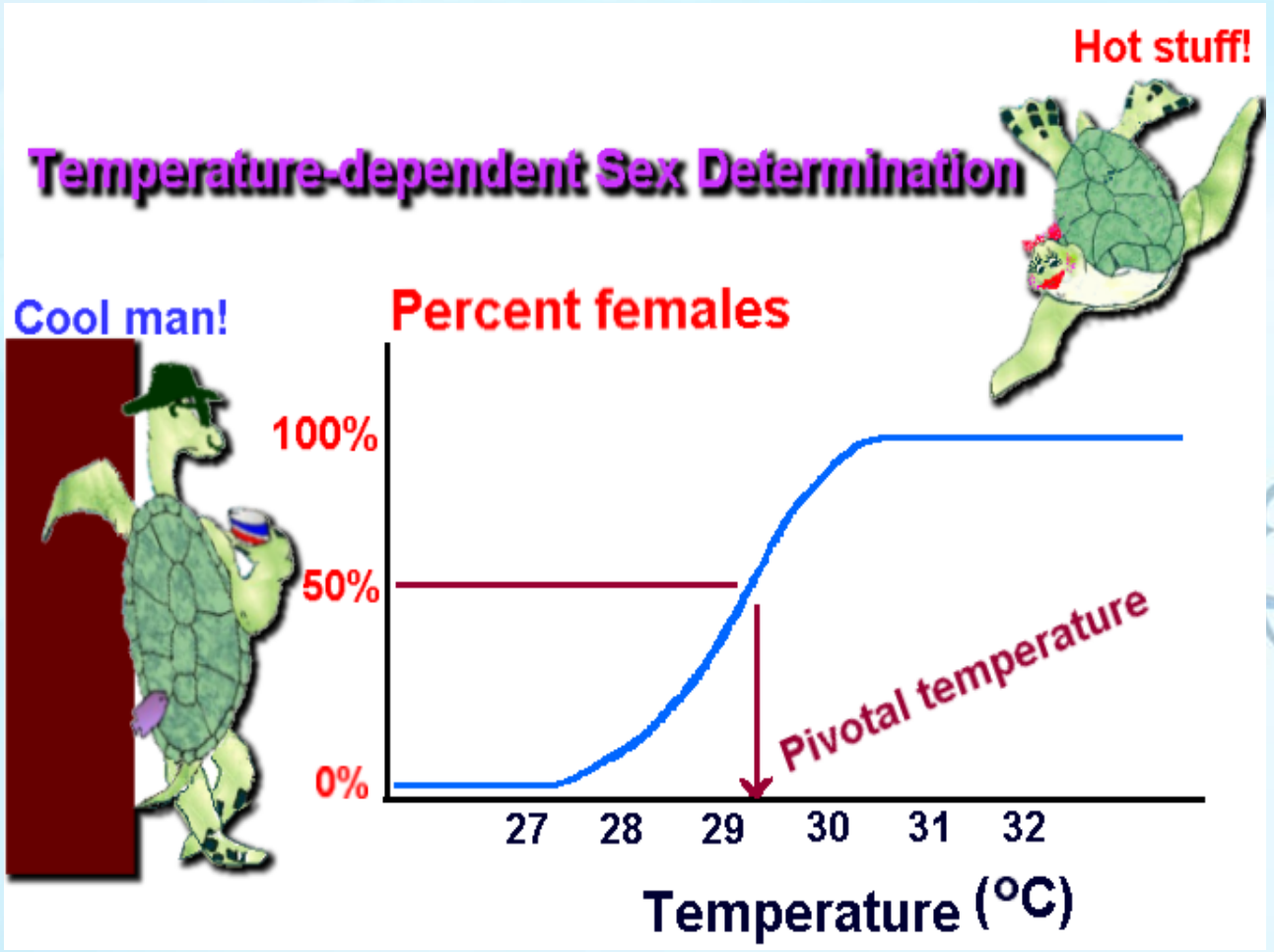
- UMT had pioneered the sea turtle research in Malaysia. In the early years, effort was done to collect data on the reproductive biology of sea turtles on nesting beaches as very limited knowledge was known about these species in Malaysia. A saturation tagging program was initiated at Redang Island since 1993 and since then a complete reproductive data was obtained (Chan & Liew, 1999; Chan 2010).
- Studies on temperature-dependent sex determination 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.

Temperature-dependent sex determination

- **Research conducted showed all hatcheries in Malaysia producing 100% female hatchlings, except those in Redang Island (*in-situ* egg incubation)**
- **All hatcheries must be partially shaded to produce a balance sex ratio**

- **Tiwol CM, Cabanban AS (2000) Sea turtles of the Indo-Pacific: Research, Management and Conservation, ASEAN Academic Press, Kuala Lumpur**
- **Chai SS, Liew HC, Chan EH, Bali (1999) Hornbill 3: 2-21**
- **Palaniappan P (1998) M.Sc. Thesis, UPM 103p**
- **Chan EH, Liew HC 1995. *Biol. Conserv*. 2(2):196-203**
- **Liew HC, et al (2002) Clutch size and incubation temperatures of green turtle eggs. Conference Proceedings 3rd SEASTAR2000:101-104**

ex-situ incubation



Female turtles build nests in shaded and exposed parts of beach : ensures mixture of male and female hatchlings

Research on Photo-identification of sea turtles

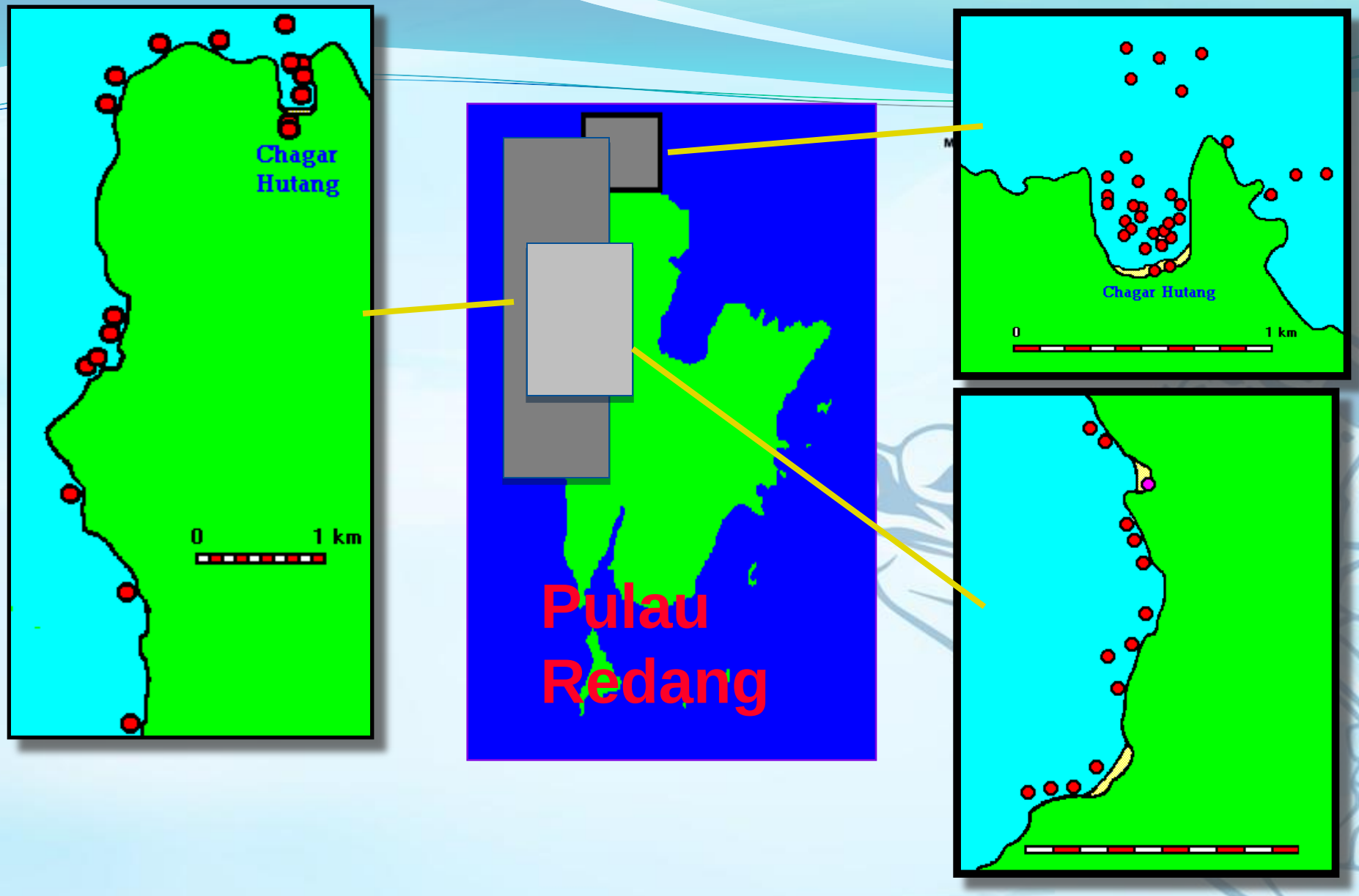
The identification of individuals within a population is essential for the collection of reliable information for any behavioural and ecological studies. Besides tagging sea turtles using inconel tags, SEATRU scientists also explore the possibility of using photo-identification technique, a non-invasive method which utilizes natural facial markings to identify individuals.

Chew YC, Liew HC, Joseph J. (2014) Marine Turtle Newsletter 146: 1-6

2. Research on the biology, ecology, threats and restoration of sea turtles

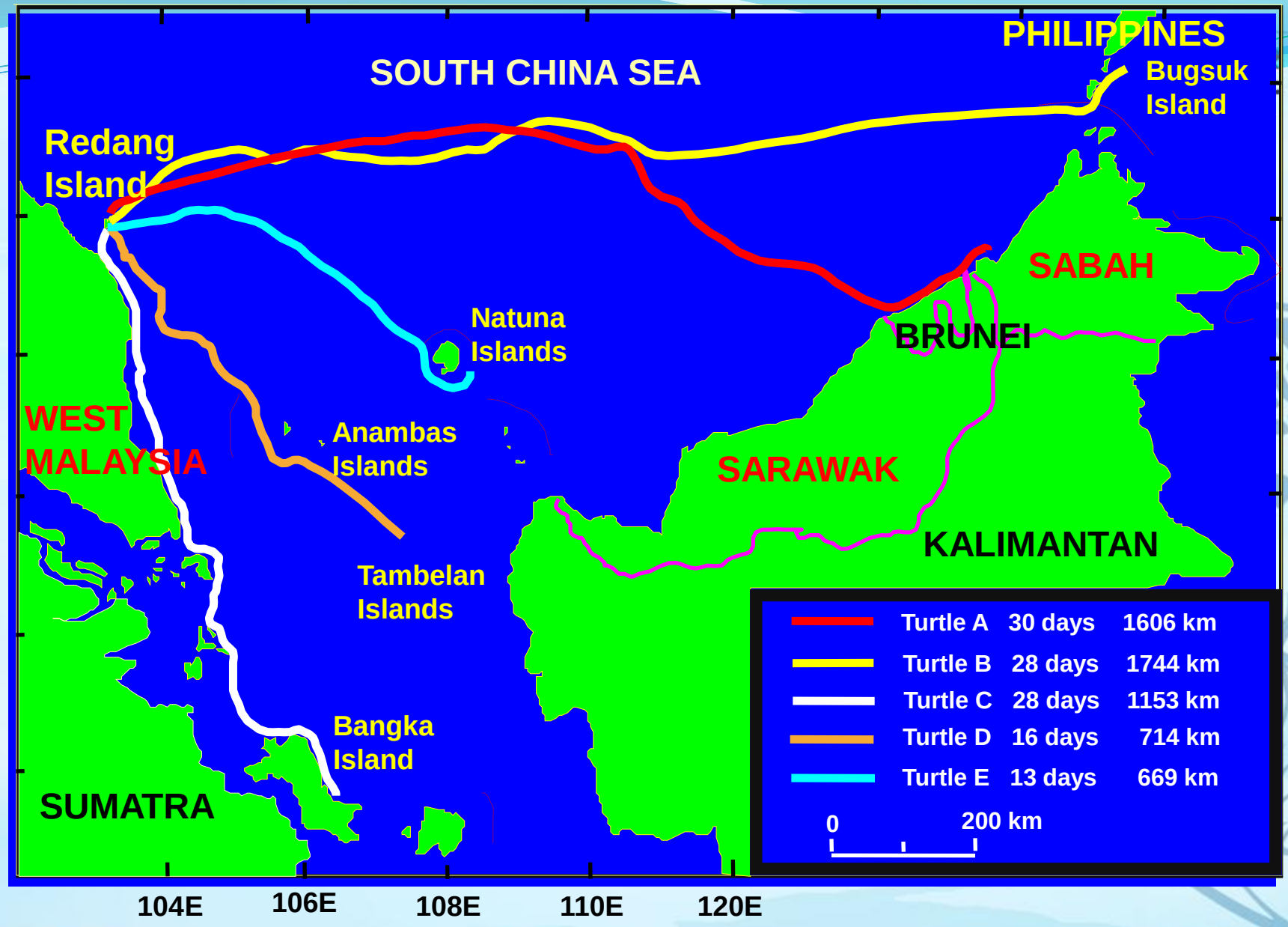
- Using bio-logging techniques, studies on internesting behaviour of sea turtles during their breeding season and migration back to their feeding grounds were also determined. In each breeding season, female sea turtles will come up to lay eggs within every 10-14 days (Chan, 2010). Attachment of radio 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 internesting 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).

Tracking of sea turtles using bio-logging



Location of visual sightings of 3 Green turtles during the internesting interval at Pulau Redang

Satellite tracking for long-distance migration studies



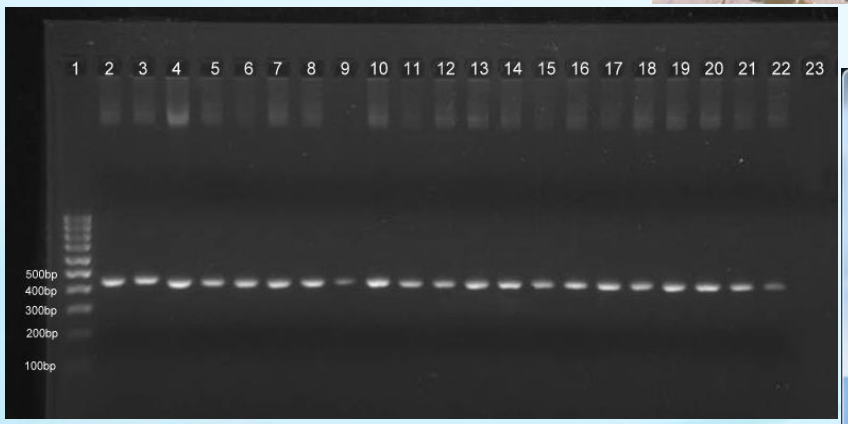
LONG DISTANCE MIGRATIONS BETWEEN

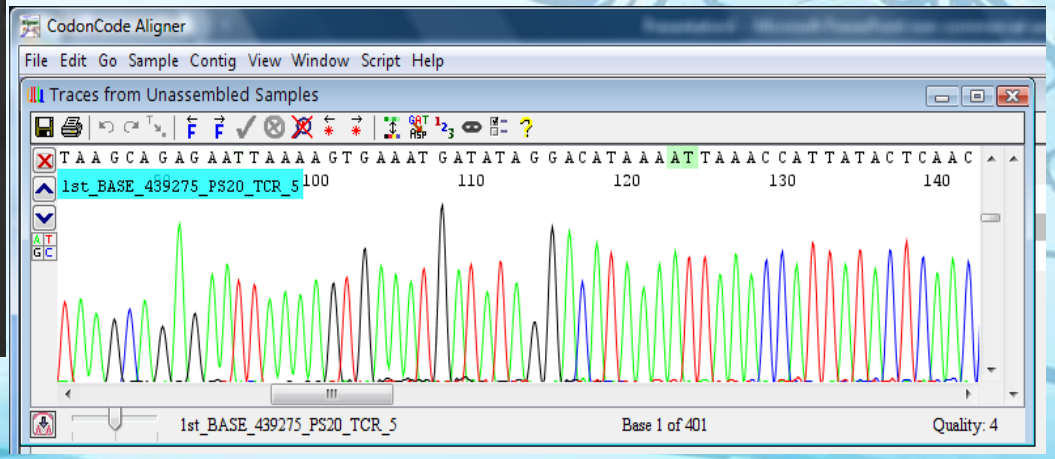
FEEDING AND NESTING GROUNDS (Liew *et al*., 1994)

2. Research on the biology, ecology, threats and restoration of sea 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 and 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.

Genetics Research





Genetics Research

Genetic analysis was used to investigate:

i. Population structure
ii. Level of multiple paternity in egg clutches of green and hawksbill turtles
iii. Genetic composition and natal origin of sea turtles at foraging grounds in Malaysia.

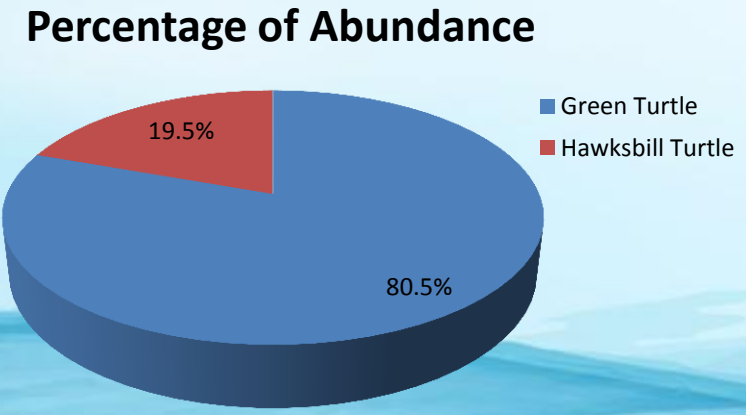
Collaboration with:
Kyoto University
University of London

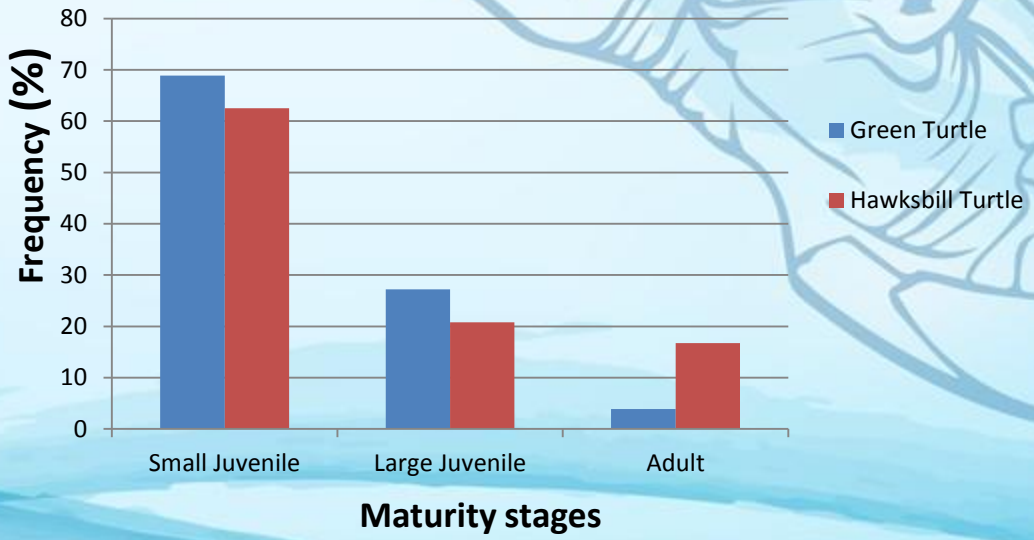
- Joseph J, Nishizawa H, *et al.* (2016) Global Ecology and Conservation 6: 16 - 24
- Nishizawa H, Joseph J, Chong YK (2016) *J Exp Mar Biol Ecol* 474: 164-170
- Joseph J, Chong YK, Palaniappan P, Liew HC (2014) *Herpetol Conserve Biol* 9(3): 516-523
- Chong YK (2012) M.Sc Thesis, Universiti Malaysia Terengganu
- Joseph J, Shaw P (2011) Conservation Genetics 12: 601-605
- Joseph J (2006) PhD Thesis, University of London

Research on sea turtles at foraging grounds

- Population abundance
- Genetic studies and health status of sea turtles

Research on sea turtles at foraging grounds





Outreach Programme

- To support the long term sea turtle research & conservation at Redang Island, SEATRU had come up with an outreach program, called STOP – Save our Turtles Outreach Program.
- Main objectives: to create public awareness and to fund the long term conservation of sea turtles at Redang Island.

Outreach Programme

STOP comprise of three programs:

i. Sea Turtle Volunteers

ii. Adopt a Turtle/Nest

iii. Turtle camps, Awareness program, etc.

Sea Turtle Volunteer Program:

- This program is open to public aged 18 and above to participate in the long-term tagging and *in-situ egg* incubation research and conservation project located at Chagar Hutang Beach, Pulau Redang. The program runs from Saturday to Saturday every week from April to October. Each slot will consist of 8 volunteers.

- The work involved is very similar to work carried out in many sea turtle conservation programs throughout the world as summarized below. All volunteers will be given a briefing on the biology of sea turtles and on the activities.

Night-time duties include:

- Patrolling the 350 meter long beach at regular intervals to locate and record all turtle arrivals/nestings
- Monitoring and timing the various stages of nesting activities of turtles
- Tagging and measuring turtles after it completed the egg laying process
- Marking and measuring the location of nests
- Assist in other research, education and conservation activities conducted by SEATRU

Day-time duties:

- Hourly beach patrol to inspect and protect nests undergoing incubation
- Excavate hatched nests and analyse nest contents
- Beach clean-ups
- Assist in other research, education and conservation activities undertaken by SEATRU
- Assist in cooking and housekeeping chores
- Of course, there will be plenty of free time for relaxing, snorkeling, swimming, hiking, etc.

- This program was initiated in 1998. Over the years, it became a popular program especially to college and university students

VOLUNTEER PROGRAM

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UMT MOOC Massive Open Online Course

- Open to public (age 18+)
- Program developed to provide volunteer assistance to the long-term conservation and research at Chagar Hutang
- Duration: 1 week for a group of 8 volunteers

Price per person

Malaysian: RM850 (non-student)
RM450 (Student)

Foreigner: USD350 (non-student)
USD250 (Student)

Price may change. Please refer http://seatru.umt.edu.my for the latest price.

Local participants: 90%
International participants: 10%

80 % were College/University Students

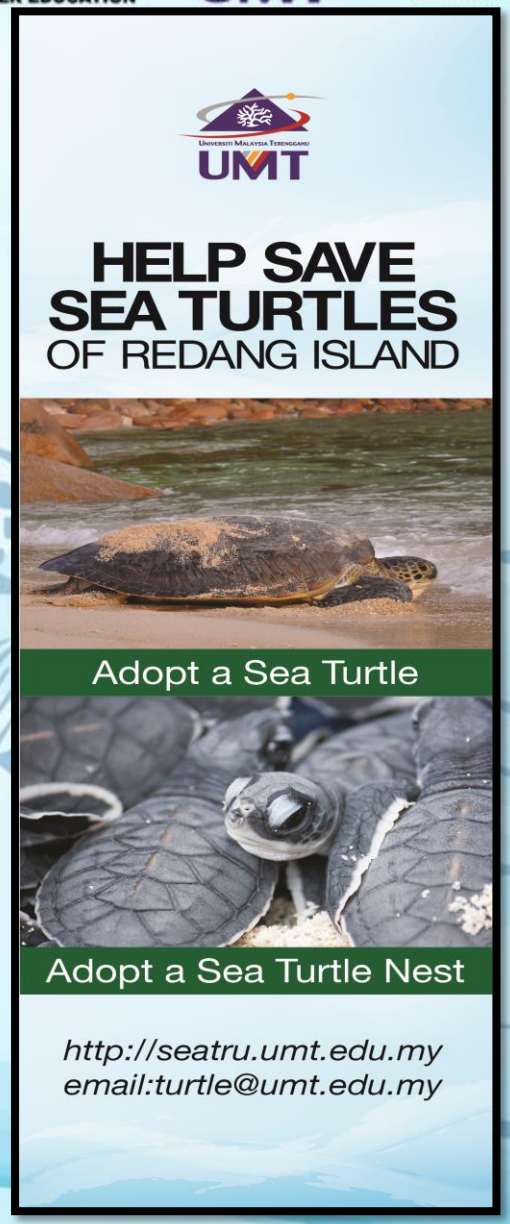
Ferry transfer sponsored by Laguna: 2004 - present

LAGUNA REDANG ISLAND RESORT
doorstep to paradise

Volunteer Program: *to create public awareness on sea turtles*

ADOPT A TURTLE/NEST PROGRAM

- This program will give the opportunity for public to make donation by adopting a turtle or a nest.
- Adoption cost is RM100 for a turtle/nest. In return, adopters will get a ‘turtle t’shirt’, a certificate of adoption and by the end of the year a complete data of the turtle/nest they adopted will be send to them.



TURTLE CAMPS

- Turtle Camps called "Kem Si Penyu" is conducted for the Year 5 primary students of Sekolah kebangsaan Pulau Redang since 1996.
- The students are taken to Chagar to spend two days and one night on the beach to learn about sea turtles and the need to conserve them in a "fun" and informal manner - watching nesting activities and emergence of hatchlings, painting turtles and engaging in turtle learning activities.
- SEATRU believes very strongly in education at the grassroots level.
- In addition, SEATRU also organize camps for international schools that carry out turtle awareness campaign such as the Mont' Kiara International School and the International School of Kuala Lumpur.

Kem Si Penyu

MINISTRY OF HIGHER EDUCATION

AWARENESS PROGRAM

MINISTRY OF HIGHER EDUCATION

UMT

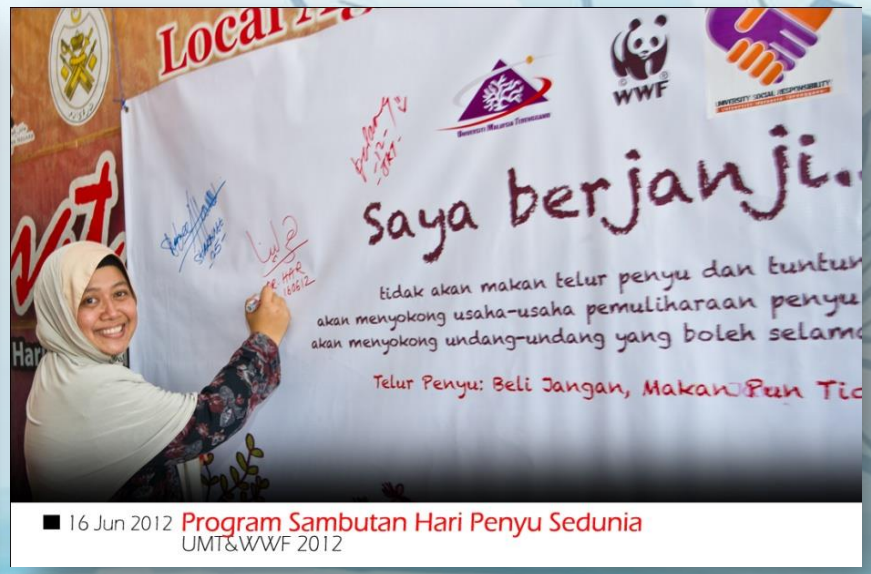
UMT MOOC Massive Open Online Course

- **SEATRU also conduct special talks on sea turtles to school children and other visitors to Chagar Hutang. Other than that SEATRU also organised exhibitions either at the university or invitation from corporate agencies.**

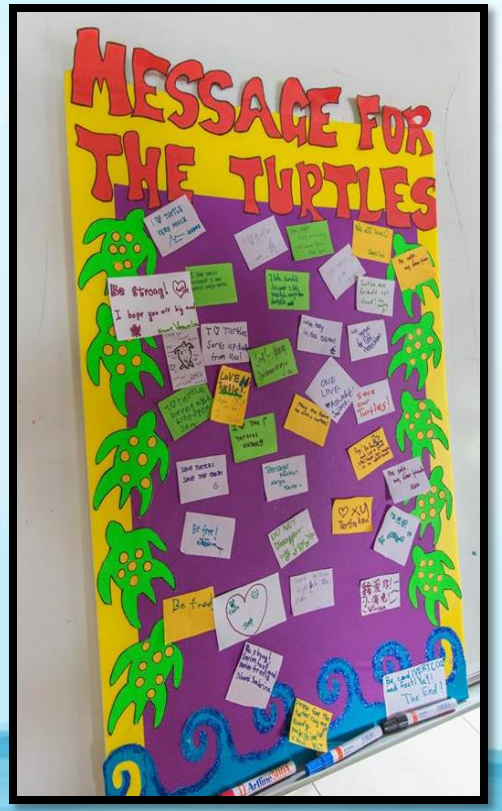
- **Since 2012, SEATRU organized a weekly Marine Awareness Program and Hatchling Release Programme at Laguna Redang Island Resort.**

Day Visit to Chagar Hutang

World Sea Turtle Day Celebration



Marine Awareness Program at Laguna Redang Island Resort



Hatchling Release Program

Talks and Exhibitions

Come and join our Volunteer Program at Chagar Hutang, and learn more about sea turtles at their natural habitat.

More Info at:

http://seatru@umt.edu.my

email: turtle@umt.edu.my

THANK YOU!