MARINE TURTLE MANAGEMENT, CONSERVATION AND PROTECTION PROGRAMME IN MALAYSIA

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INTRODUCTION

Malaysia's involvement in turtle management, conservation and protection came to its peak when the MoU on ASEAN Sea Turtle Conservation and Protection was signed on 12th September 1997, although this does not mean that it stops here. The recognition of the significance sea turtles in Malaysia extend beyond that, as such all relevant authorities particularly the Department Of Fisheries Malaysia and most state governments, are putting emphasis on enhancing programmes on management, conservation and protection of these living marine creatures declared as heritage to the nation. Proper and applicable management plans, together with sufficient legislation are thus given much emphasise as attempt to save the turtle population from extinction due to the decline in the marine turtle population over the past few decades.

The survival of sea turtles is being threatened among other by commercial exploitation, habitat destruction and alteration, fisheries interaction, marine debris, pollution and ineffective protection (Chan,1991). As a result, leatherback and olive ridley population in Terengganu are critically depleted and in imminent danger of extinction (Rahman,1996; Chan and Liew, 1996) and for the last few decade, dramatic declines in population have occurred for all the turtle species found in Malaysia (Chan and Liew, 1995).

DEVELOPMENT OF MANAGEMENT AND CONSERVATION PROGRAMME

Law And Enforcement

At Federal level, the Fisheries Act 1963 and subsequently the Fisheries Act 1985 (Amended 1993) which serve as the primary legislation for the protection of fisheries, provides for the inclusion of turtle conservation, management and development as a resource. Through the powers conferred in this Act, state governments may exercise their right to make rules and regulations regarding turtle and turtle eggs. Of the eleven states in Peninsular Malaysia, seven currently have turtle legislation and two (Penang and Perak) have a draft document in review and two states (Perlis and Selangor) lack legislation. Sarawak and Sabah each have separate legislation regarding turtle protection.

The protection of turtle was established way back in 1915, as suggested by the River Rights Enactment 1915 of Perak follow by Turtle Enactment Act 1951 of Terengganu; Fauna Conservation Ordinance 1963 of Sabah; Turtle Trust Ordinance 1957 of Sarawak and Fisheries (Turtle and Turtles' Eggs) Rules 1976 of Negeri Sembilan to mention but a few. Unfortunately, most State enactment and legislations deal with the regulated exploitation of turtle and turtle eggs and less emphasis given to the management, protection and research output. Although the jurisdiction over conservation and protection of

turtle in Peninsular Malaysia is under the various State governments, the implementation and enforcement of the law are carried out by Federal agencies such as the Department of Fisheries Malaysia.

Hatcheries Development

Realising the needs to conserve and to protect the turtle population from further depletion, couple by awareness and concern from the relevant authorities, the public and the non-governmental organisations, much attention and effort have been focused on their conservation vis-a vis single life style: eggs on the nesting-beach.

As a result, a management programme based on this application were manifested by the establishment of first hatchery for leatherback in Rantau Abang in 1961 which was eventually gazetted as Rantau Abang Turtle Santuary in 1989 (Rahman, 1996). Nevertheless, hatchery operation as a conservation technique has been a practice in Malaysia since 1941 in Sarawak, 1951 in Kelantan and Terengganu, 1966 in Sabah, 1971 in Pahang and 1988 in Melaka, Perak and Pulau Pinang (Sukarno, unpub.). Since than, more than 15 turtle hatcheries have been set up along the coast of Terengganu, Pahang, Johor, Melaka, Perak and Pulau Pinang. Other potential areas are also being studied such as in Pulau Telur (Kedah), Pulau Tioman (Pahang) and Pulau Tinggi (Johor) with the intention of setting up turtle hatchery or turtle santuary.

Control Of Egg Collection

The success of 'hatchery technique in conservation' depends entirely on the number of turtle eggs being collected and incubated. In the past, coastal villagers have been engaged in the collection of turtle eggs particularly the leatherback in Rantau Abang, Terengganu for consumption and sale which resulted in hatchery operation failed and hence a drastic declination in population. With the organised management programme and the promulgation of the turtle enactment, 1951, the sale and consumption of leatherback eggs was banned in 1989 as to ensure all eggs will be incubated in the hatchery (Rahman, 1996, Chan and Liew, 1996).

Control Of Offshore Fishing Activity

Selected coastal beaches and territorial waters of East and West Malaysia where the former provide the natural nesting habitat while the latter form the foraging areas, are the main areas most frequently utilised by turtles during the nesting season. Therefore, offshore protection of adult turtle is as crucial as protection of eggs, nesting turtle and beaches (Chan and Liew, 1995). Thus, as the pelagic nature of sea turtle which render them vulnerable to most fishing gears, crucial management programme were taken to ban on use of 'pukat pari', a drift net with mesh size exceeding 25.4 cm (10 inches) in 1989. Other fishing gears such as trawls, driftnets and traps also posed a significant threat to sea turtle (Chan and Liew, 1996) of which leatherback population of Rantau Abang, Terengganu is of a great concern. Subsequently, the Rantau Abang waters has been gazette as Fisheries Prohibited Areas in 1991 which covers the area of three nautical miles from the shoreline. All fishing activities were prohibited in this area as to minimise incidental captures of leatherback in fishing gears.

Research And Monitoring

Research and monitoring of marine turtle is conducted by the Department of Malaysian Fisheries Research, Development and Management (MFRDMD), based at Chendering, Terengganu. Other local higher institution learning such as University College Terengganu in Terengganu, University Putra Malaysia in Selangor and non-governmental organisations are also actively involved in reseach on marine turtle conservation and protection.

Research undertaken by MFRDMD were initiated in the early 1990 which includes research on tagging in Terengganu, Pahang and Perak; nursing experiment of leatherback turtle; studies on ecology

of the painted terrapin in Terengganu; studies on incubation of marine turtle eggs in hatcheries; study on incubation of green turtle in laboratory; turtle beach surveys in Pahang, Terengganu, Johor, Melaka and Perak; study on stock identification of green turtle in east coast of Peninsular Malaysia and monitoring of marine turtle population and hatchery operation.

POPULATION AND DISTRIBUTION OF SEA TURTLE IN MALAYSIA

General Information

Four species of sea turtle, the leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*) and olive ridley (Lepidochelys olivacea), nest along the sandy beaches of both East and West Malaysia (Chan, Liew, Papi and Luschi,1995; Rahman, 1996). Out of eleven states in Peninsular Malaysia, nine states indicate the availability of these turtle, with Terengganu having the most abundance annual occurrences of all species. Loggerhead (*Caretta caretta*) has also been reported to nest in small numbers in Sarawak. All five species are listed in IUCN Red Data Book as endangered species (Chan, 1991; Kamaruddin, Ismail and Azlan, 1996; Rahman,1996).

The current status of the sea turtle distribution and nesting in Malaysia is shown in Table 1 while Appendix 1 show the historic record of turtle nesting/landing from 1991 to 1998.

Table 1: Turtle nesting/landing in Peninsular Malaysia in 1998 (Source: Department of Fisheries Malaysia).

State	Leatherback	Green	Olive Ridley	Hawksbill
Terengganu	19	2,350	4	10
Pahang	0	231	1	0
Johor	0	6	1	43
Melaka	0	0	0	222
Perak	0	132	0	0
Kedah/Perlis	0	0	0	0
P. Pinang	0	0	0	0
Total	19	2,719	6	275

The largest numbers of sea turtle are recorded in Terengganu, followed by Pahang, Melaka and Johor. No turtle nesting/landing are recorded in Kedah/Perlis and Pulau Pinang in 1998 though there is information saying that turtles are nesting/landing in Pantai Kerachut (Pulau Pinang) and Pulau Telur (Kedah).

Leatherback Turtle

Leatherback is undoubtedly the most abundance in Terengganu, particularly along the 15 kilometers stretch of coastline between Kampung Jambu Bongkok to Kuala Abang with Rantau Abang as the centre of nesting concentration (Chan, 1991). It was also recorded that the major rookeries are found particularly at the 1.5 kilometers stretch of beach of Rantau Abang and Paka, Terengganu and on the beach of Chendor, Pahang (Sukarno,Unpub.). However, the nesting concentration appears to have shifted away from Rantau Abang, to the adjacent areas of Rhu Khubur in the north and Ketapang in the South (Chan, 1991) as reflected from the nesting/landing data.

In the 50's, about 10,680 nesting were recorded in Rantau Abang annually and these numbers declined to only 207 in 1991 and 19 in 1998 (Department of Fisheries Malaysia, Unpub.) which represent about 1.9 % and 0.2 % respectively, of the figures recorded in the 1950's. Nesting season of leatherback is from March to September with June to July the peak period. No report was made about the nesting/ landing of leatherback on the west coast of Peninsular as well as on Sabah and Sarawak beaches.

Green Turtle

The green turtle is by far the most extensively distributed sea turtle species in Malaysia, particularly in Pulau Redang, Pulau Perhentian Besar, Penarik, Chukai, Kerteh, Paka and Geliga in Terengganu; Chendor, Cherating and Tioman in Pahang; and Segari/Pantai Remis in Perak. Nesting is also recorded in smaller scale in remote beaches at Pekan and Rompin, Pahang; Pulau Telur in Kedah and also in Pulau Pinang. In East Malaysia, nesting are concentrated on the Sarawak Turtle Islands of Talang-Talang Besar, Talang-Talang Kecil and Satang Besar and Sabah Turtle, Island of Pulau Bakkungaan Kecil, Selingaan and Gulisan.

The annual nesting/landing of green turtle in Peninsular Malaysia fluctuates from 5,865 in 1991 to 3,513 in 1995 and 2,719 in 1998 which registered a declines in population. The green turtle nest throughout the year with a peak in June to July. For Terengganu alone, the nesting in 1995 (3,151 nests) when compared to the nesting reported in 1961 (estimated 9,289 nests) show a decline of about 66 % (Rahman, 1996) while Chan *et.al.*(1991) suggested the nesting in 1990 represents only 12 to 40 % of the nesting recorded in the 1940's to 1950's. Thus, the figures reflect that the green turtle population in Malaysia is to be considered in critical condition.

Hawksbill Turtle

Melaka has the highest concentration of hawksbill nesting/landing in Peninsular Malaysia. The major nesting sites in the state are Pulau Upeh, Kuala Linggi and Tanjung Bidara. Hawksbill can also be found in Terengganu, Pahang and the offshore Islands of Johor. The distribution of hawksbill in east Malaysia are concentrated on the Turtle island of both Sarawak and Sabah. Pulau Gulisan off Sabah is believed to be the most significant hawksbill nesting site in Malaysia. Generally, the peak nesting season for hawksbill is from March to June (Sukarno,1996).

The nesting/landing of hawksbill in Peninsular Malaysia as a whole recorded a slight fluctuation throughout 1991 to 1999 as shown in Appendix 1. Nevertheless, most states recorded a drop of between 27 % - 60 % in 1998 as compared to nesting/landing recorded in 1991, while Pahang recorded no nesting/ landing at all.

Olive Ridley Turtle

Most olive ridley turtle can be found in Terengganu though the population in Peninsular Malaysia are relatively small in number. Olive ridley turtle were also reported to nest in Pahang, Perak, Johor and Pulau Pinang (Rahman,1996; Dof, Unpub.). The major nesting/landing places in Terengganu are Kuala Baru, Telaga Papan, Pulau Kapas, Dungun, Paka and Geliga; while in Perak and Pulau Pinang, the nesting sites are Pantai Segari and Pantai Kerachut respectively. The peak nesting season for olive ridley in general is between February and May.

Information on olive ridley is fragmentary which show that very few remain today as shawn in Table 1. In 1991, the total nesting/landing recorded were 126 nests and reduced drastically to only 6 nests in 1998 which represents to about 4.7 % of the nesting recorded in 1991.

EXPLOITATION AND THREATS

Over- Exploitation Of Turtle Eggs

Turtle eggs have been consumed by coastal villagers as delicacy for many centuries. Excessive egg harvest contributes to dramatic decline in the nesting population of all the species. In Terengganu, except for leatherback eggs, 60 % of other species of turtle's eggs were being consumed every year from 1990 – 1995 (Rahman,1996). All turtle eggs were consumed locally with price ranges from RM1.00 to RM2.00 (Nasir and Sharma, 1999) and even goes up to RM5.00 per egg (Yoga, The Star July 20th 1999, p.9).

For the past decades, the coastline have been regarded as common property, meaning turtle egg harvesting was open to all which often unregulated or partially regulated with few restriction on entry. For example, Terengganu Turtle Enactment 1951 provides for the division of nesting beaches into lots, with each lot tendered to the highest bidder. Similar situation could also be observed in most of the states in Peninsular Malaysia whereby a percentage of eggs collected is allowed to be sold for consumption.

Of late, there is a requirement endorsed legally or administratively by the states giving the sole right to harvest turtle eggs to the Department of Fisheries for the purpose of conservation as is dine in Terengganu (hatcheries at Rhu Kudung and Ma'Daerah).

Coastal Development

Commercial coastline development is recognised as one of the major threats to turtle nesting/landing density by eliminating their nesting habitat. Construction of resorts, hotel, restaurants, public recreational areas and industrial plants have rendered once remote beaches unsuitable for nesting/ landing and brings more human onto nesting beaches, adversely affecting nesting and buried eggs.

Rantau Abang and Paka/Kerteh in Terengganu, Pulau Pinang and Melaka are some good examples not to mention those coastline development of some islands in Terengganu, Pahang and Johor.

Incidental Capture In Fishing Gears

Trawls nets, drift nets and long line attributed to mortality of Sea turtle especially during nesting season. Gravid female turtles are particularly vulnerable to capture in fishing gears during the nesting season as they normally reside in inshore waters for long period. Besides the gravid adults, newly emerged hatchling are also vulnerable to fishing operations near the nesting beaches, especially those using light (Chan,1996). In Terengganu alone, 188 turtles were reported dead from 1990 to 1995 due to incidental capture in fishing gears (Rahman,1996). This is by far the largest human-caused source of sea turtle mortality.

Lack of Education And Public Awareness

Awareness is still lacking, especially from direct stakeholders such as the fishermen, village folks, tourist operators, chalets and hotel operators. Lack of knowledge and awareness in biology, conservation, protection and other practices may lead to negative attitude and manhandling of turtle and destruction of its habitats.

Disturbances On The Beach

Many nesting/landing site is an open-access area where vendors and tourists are allowed free access and hence inviting human disturbance. Highly publicised site such as Rantau Abang and Redang (Terengganu), Cherating and Tioman (Pahang), Tanjung Bidara (Port Dickson) to mention but a few is being visited by tourist resulting in intense disturbance.

Hatchery Management Practices

Local Department of Fisheries staff (Fisheries Assistants) assisted by contract workers are appointed to oversee the daily management of the hatcheries. Due to lack of knowledge in biological sciences and poor handling of proper incubation technique, there are reports of low percentages of eggs incubated. For example, improper handling of marine turtle through rotation and vibration during transportation to the hatchery by the egg collectors, the extended replanting period, rough handling before and during replanting process reduces hatching rate.

CONSERVATION AND MANAGEMENT PROGRAMME

Rules And Legislation

Both the Fisheries Act 1985 and the Wild Life Protection Act 1972 were found to be inadequate. As such, States legislation concentrates on regulated exploitation of turtle through licensing permits for harvesting eggs, with few measures for conservation objectives (Sharma and gregory, 1996). Therefore, there is an urgent need to focus and to streamline the objective of conservation and protection of turtle. In realising such need, the Department of Fisheries Malaysia together with WWF Malaysia is taking step to formulate a model legislation for the management, conservation and protection of marine turtles and painted terrapin with the hope that this will be accepted by all States and incorporated into their existing turtle Enactments/Regulations.

Hatcheries And Santuaries

Hatcheries and santuaries for in-situ and ex-situ incubation, protection of nesting habitats and buffer zone will be developed and upgraded so as to include research, educational, awareness and interpretation component. New site potential for hatchery or santuary with it's buffer zone will be identified and gazetted as to protect the site from intrusion and further development. Under the new concept of hatchery and santuary, the public are invited to fund, to manage and to draw management plan and education programme. Good example is the Ma' Daerah Turtle Santuary in Terengganu where BP Petronas Acetyls financed the construction of the centre while BP Amoco sponsored the educational and awareness programme.

National Centre For Turtle Management And Marine Ecosystem, Rantau Abang, Terengganu

The center was completed in June 1999 with the cost of nearly RM 7.5 million. The objectives were i) to establish a centre of excellence for management and conservation of turtle and other endangered marine species; ii) to establish a research centre for turtle, other endangered marine species and marine ecosystem; and iii) to establish a centre for interpretation, awareness, education and training.

Capacity Building For Conservation, Research And Management

There is a shortage of adequately trained personnel to carry out appropriate research, conservation and management programmes. As such, personnel will be trained in appropriate line of expertise, locally and externally.

Education, Awareness And Interpretation

Educational and awareness programme among different stakeholders will be enhanced, with the aim to promote protection, wise use and public understanding of turtle management, conservation and protection. Information centre, development of training for stakeholders, production of print and broadcast materials, visitor orientation and exposure trips will be developed further. Educational kits such as marine educational kit will be expended to include environmental protection and conservation for school pupils, government officials, residents and local folks.

Marine Protected Area (MPA) And Marine Parks

Marine parks is an area of the sea zoned as a santuary for the protection of its marine eco-systems and its associated fauna and flora. Till today, the waters of two nautical miles from the shoreline of 40 islands of Kedah (4 islands), Terengganu (11 islands), Pahang (9 islands), Johor (13 islands) and Labuan (3 islands) are gazetted as Marine Parks as given under the provision of the Fisheries Act 1985. Further more, the waters of two nautical miles from the shoreline of three islands in Sarawak, Tanjung Tuan and Pulau Besar in Melaka were gazetted as Fisheries Prohibited Area. Under the provision given, any activity which are harmfull and destructive to the marine resources and eco-systems are prohibited and this includes turtle and its habitats. The establishment of marine parks as a whole provide major form of habitat conservation and protection for marine resources.

Research And Monitoring

Department of Fisheries Malaysia realise that there is insufficient information on the status of turtle population and habitat, biology, behavior, ecology and threats to the survival of marine turtles. This constrains the formulation of effective management, conservation and protection measures. As such full support and funding and personnel will be provided for research and monitoring programmes. New area/technique of study such as 'GIS', 'telemetry survey', special area management plan for turtle habitat, study of carrying capacity for visiting nesting/landing site and DNA study to mention but a few will be carried out.

CONCLUSION

Four species of marine turtle found in Peninsular Malaysia are confirmed to nest in decreasing order of abundance and the Department of Fisheries Malaysia with the help of other government agencies, non – governmental organisation and the public are already working on ways to improve the management, conservation and protection programmes. Research, hatchery and sanctuary management practices, education, public awareness and management and conservation issues will be given more emphasis and handle seriously.

Since turtle transcend national boundaries, effective conservation and protection could not be independently realised at national level alone. Thus, collaborative work with other ASEAN countries, especially in awareness programme, research and data collection should be extended and ASEAN programme and work plan for marine turtle conservation and protection is the best initiation.

ACKNOWLEDGEMENT

We would like to thank Dato' Mohd Mazlan bin Jusoh, the Director General of Fisheries Malaysia and Mr. Hashim bin Ahmad, the Deputy Director General of Fisheries Malaysia for their permission, support and encouragement in preparing this country report for the SEAFDEC - ASEAN Regional Workshop On Sea Turtle Conservation and Management on the 26th – 28th July 1999.

We would also like to thank Abdul Rahman Kassim of the Terengganu Department of Fisheries for his contribution in information and data on marine turtles in Malaysia and last but not least, we would like to express our gratitude to Ahmad Azahari bin Ahmad, Mohamad Zabawi bin Saat, Hamidon bin Ahmad and Zulkapeli bin Zainal from Marine Parks Section, Department of Fisheries Malaysia for their comments and contribution to the production of this country paper.

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Anual nestings/landings of marine turtle in Peninsular Malaysia for the period of 1991 to 1998

State	Species	1991	1992	1993	1994	1995	1996	1997	1998	Total
Terengganu	Leatherback	207	231	63	213	38	68	41	19	880
	Green	5,311	1,688	3,296	1,960	3,032	1,938	2,776	2,350	22,351
	Hawksbill	25	28	38	53	6	10	19	10	189
	Olive ridley	118	78	98	21	35	38	18	4	410
Pahang	Leatherback	0	1	2	0	0	1	0	0	4
	Green	437	137	230	253	254	165	319	231	2,026
	Hawksbill	2	0	8	1	1	0	0	0	12
	Olive ridley	8	2	0	3	3	4	0	1	21
Melaka	Green	0	5	15	0	0	0	0	0	20
	Hawksbill	306	269	203	233	255	297	241	222	2,026
Johor	Leatherback	0	0	0	0	0	7	3	0	10
	Green	0	5	15	0	0	0	100	6	126
	Hawksbill	63	69	94	10	0	45	108	43	432
	Olive ridley	0	0	9	0	0	0	0	1	10
Perak	Green	67	102	211	197	197	144	128	132	1,178
	Olive ridley	0	0	2	0	0	0	0	0	2
Kedah	Green	50	46	60	0	0	0	0	0	156
	Olive ridley	0	0	22	0	0	0	0	0	22
P. Pinang	Green	0	0	0	0	30	13	4	0	47
	Olive ridley	0	0	0	0	0	1	0	0	1
	Total	6,594	2,661	4,366	2,944	3,851	2,731	3,737	3,019	29,923