

STOP EATING EGGS?

**What children on two islands in Malaysia
think about sea turtles as an endangered species**

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Thesis for the fulfilment of
Master of Environmental Science
Lund, Sweden, November 2004

Acknowledgements

My academic background is BA Hons Geography graduate (University of Malaya). My graduation exercise title is "Turtle Population In Terengganu, Malaysia: Development Over The Period 1990-2000". I started joined the sea turtles conservation since 1999. I have been a volunteer for every nesting seasons at different turtle conservation beaches such as Turtle Information Centre which is situated at Rantau Abang, Terengganu; SEATRU Programme at Chagar Hutang, Redang Island, Ma'Daerah Sanctuary Volunteer Programme under Department of Fisheries Malaysia (DoFM) and WWFM; and Perhentian Island Turtle Sanctuary. I had wonderful experiences every nesting season. As a volunteer, I managed to help the DoFM especially on monitoring the nesting activities. Each and every single turtle will be tagged with its own ID numbers. Then, I had to keep track of the turtle's nesting activities within one nesting season, as well as previous seasons and future seasons. In other words, I was chosen by them to help and gather on accurate data.

I would like to express my gratitude to all those who gave me the possibility to complete this thesis.

I am deeply indebted to my supervisor Ass. Prof. Per Wickenberg from the Sociology of Law Institute, Lund University whose help, stimulating suggestions and encouragement guided me during the research and writing of this thesis.

I want to thank the headmaster from Redang and Perhentian Island for giving me permission to do my research in the school. Thanks to all teachers, villagers, government officer for participating in my interviews. Especially, I am obliged to Mr.Feisal, Mr.Hilmi, Mr.Rabbi and Ms.Noriko.

Thanks to LUMES interdisciplinary programme!!!

LUMES Family - all my mates & friends, the past year and a half wouldn't have been as fun without you guys. Thank you all for the support & countless parties we have been through.

I need to thank my parents from whom I receive support, encouragement and prayer.

Last but not least, thanks to all school children from both islands and the "gentle creatures" – the sea turtles.

Abstract

In Terengganu-Malaysia, sea turtles are facing serious threats to their survival just like in other places which led to extinction of other species. Today, there are only four species of sea turtles that continue to nest along the shores of Terengganu. Through the years, the overall numbers of species of turtles that land in Terengganu have decreased dramatically. For this paper, I chose the islands of Redang and Perhentian as my study areas because these are the most visited islands by sea turtles, and at the same time, children who are brought up in these islands have real life experience with this wonderful creature. In Terengganu, adult turtles are not eaten by people but their eggs are used for food. Unfortunately, the strong demand for turtle eggs has led to over-collection and over consumption due to illegal harvesting and sale by non-licensed locals. Most of these children's parents are not educated; they have very little awareness of the concept of extinction.

In this thesis, I used “The Norm Triad” (Hydén, 1998) as an instrument or a tool to analyse, interpret and understand under what circumstances the environmental theme (here: sea turtle as an endangered species) has been established with adult and children as key actors on both islands in Malaysia. The norm concept is the point of departure in order to be able to interpret and understand the actions and action patterns of individuals, groups and organisations on the islands.

This paper describes the analysis' results of questionnaire studies, interviews and drawings of primary children's views about sea turtle. We can see that science knowledge and ecological understanding are weak and vague in both islands about the sea turtles' declining crisis in Malaysia. Therefore, some recommendations are suggested such as: developing the islander's interest to care for sea turtles, enhancing ecological understanding through environmental education or education for sustainable development in schools; creation of alternative income possibilities for islanders, and some other suggestions.

Keywords: ecological understanding, education for sustainable development, endangered species, environmental education, norms, sea turtles and sustainable development.

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Abbreviation

CITES	-	Convention on International Trade and Endangered Species of Wild Fauna and Flora
DoFM	-	Department of Fisheries Malaysia
DOE	-	Department of Environment
DWNP	-	Department of Wildlife and National Park
EE	-	Environmental Education
ESD	-	Education for Sustainable Development
ICT	-	Information and Communication Technology
IT	-	Information Technology
IUCN	-	International Union for Conservation of Nature and Natural Resources
KBSR	-	Kurikulum Bersepadu Sekolah Rendah (Integrated Curriculum for Primary School)
KUSTEM	-	University College of science and Technology Malaysia
MSC	-	Multimedia Super Corridor
NGO	-	Non-Governmental Organisation
SEATRU	-	Sea Turtle Research Unit
TUMEC	-	Turtle and Marine Ecosystem Center
UN	-	United Nation
UNCED	-	United Nations Conference on Environment and Development
UNESCO	-	United Nations Educational, Scientific and Cultural Organization
WSSD	-	World Summit on Sustainable Development
WWF	-	World Wildlife Fund
WWFM	-	World Wildlife Fund Malaysia

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1. Introduction

1.1. Sea turtles as an endangered species in Malaysia

Introduction on Sea Turtles

Marine turtle populations have long been exploited throughout the Indian Ocean and Southeast Asian region (Frazier, 1980). Human activities that directly or indirectly threaten marine turtles include the harvesting of eggs and turtles, fishery related mortality, inappropriate management practices, destruction or modification of habitats, pollution, marine culture and tourism. In many cases, it has been the combination of modern fisheries (mechanisation and fishing gear) and traditional practices (turtle harvesting) that has resulted in drastic declines in sea turtle population in recent years (Shanker & Pilcher, 2003).

General description about sea turtles

Sea turtles have been on earth for one than 100 million years. They are unique because of their habit of nesting on the same sandy beach where they emerged as hatching before. They have the capacity to live longer than most species and it takes 20 to 50 years for turtles to mature (Sharma & Salam, 1999). Sea turtles are migratory and they may travel hundreds to thousands of kilometers from their feeding ground to nesting beaches. The hard body shell or carapace on the back of the turtle offers protection from enemies. The front and rear flippers of sea turtles have been adapted for swimming. Although they can stay under water for a long time, they will drown if they are unable to come up the surface of the water to breathe.

On the average, scientist identified that female turtles lay eggs four to six times per year during the nesting season with an interval of 8 to 15 days between nesting bouts, depending on species, and they may not lay eggs again for 2 to 4 years (Sharma & Salam, 1999).

Nest temperature is critical in determining the incubation period and the sex of growing sea turtles embryos. The eggs must remain undisturbed in the warm sand for about 55 days or two months (Ripple, 1996). Since the temperature of the sand governs the speed at which the embryos develop, warmer temperatures produce more female while males are produced at cooler temperatures (Sharma & Salam, 1999). Sharma & Salam (1999) state that upon emerging from the nest, hatchlings crawl toward the sea and keep swimming for three to four days without nourishment. Sea turtles hatchlings have high mortality rate and it has been estimated that only one out of every 1,000 hatchlings eventually survive to adulthood.

Out of the seven sea turtles species found throughout the world, four frequent Malaysian coastal waters and come ashore to lay their eggs. According to Sharma & Salam (1999), the long stretch of sandy beach in Terengganu is the primary nesting area and record about 2,000 to 5,000 sea turtles nesting annually. This is followed by the Borneo Islands of Sabah (1,000 to 3000 nests) and Sarawak (2,700 to 3,000 nests). Due to the various threats to sea turtles, nesting populations have declined as much as 60 to 99% since the 1950s.

In Malaysia: Egg collection

The collection of eggs in Southeast Asia is widespread, and one of the main threats to turtle survival in the region. In the early 1970s, less than 10% of eggs were retained for incubation in hatcheries in peninsular Malaysia. In 2001, the percentage of eggs protected in Peninsula Malaysia has been increased to approximately 50%. The remainder is marketed by the licensees (Siow & Moll, 1982). According to Siow, over 4,100,000 eggs were harvested in Sarawak, Malaysia, between 1967 and 1978, of which only 2% were transplanted to hatcheries. The population has declined steadily with little chance of recovery. In contrast, in Sabah, from 1965 to 1978, a total of over 6,000,000 eggs were collected and slightly over 2,700,000 were transplanted to hatcheries, of which 66 % hatched (Siow & Moll, 1982). The eggs are also considered a delicacy and sometimes consumed as an aphrodisiac which can arouse man's sexual desire. The traditional theory has not been proven scientifically and remains an unfounded belief. However, studies have shown that chicken eggs are more nutritionally. (see Table 1)

Table 1: Chicken eggs VS Turtle eggs

	Fresh Chicken egg, whole	Fresh turtle eggs, whole
Refuse (%)	13	5
Energy (Kcal/100g)	155	123
Moisture (%)	74.1	78.5
Protein (g/100g)	12.9	12
Fat (g/100g)	11.1	8.2
Fibre (g/100g)	0	0
Ash (g/100g)	1	1

Source : Chan, 1991 (extracted from Tee, 1985)

According to Sharma & Salam (1999), from the 1960s to the 1980s, virtually every clutch of eggs was harvested by licensed egg collectors as this proved to be a profitable venture. Today, in the open market, egg prices ranged from RM2.00 (4 kronor) to RM3.00 (6 kronor) per egg depending on the species. Prices also varied between the different States. Turtle eggs were either sold for consumption or sold to State authorities for incubation in hatcheries. In the 1990s, the decline in turtle nesting population was apparent and licensed egg collectors did not make as much money as before (Sharma & Salam, 1999). Furthermore, stringent guidelines and regulations regarding egg collection were drawn up by certain states and these regulations are still to be applied today. In other words, commercial exploitation of eggs is a primary threat to marine turtles in Malaysia.

Introduction to the study field of this thesis

In Terengganu, Malaysia, sea turtles are facing the same serious threats; just like other places that eventually will lead to extinction. There are four species of sea turtles that still nesting along the shores of Terengganu. They are the Leatherback turtles, Green turtles, Olive Ridley turtles and the Hawksbill turtles; all endangered species as classified in the IUCN Red List of Threatened Species (IUCN, 2004). The overall species of turtles that landing in Terengganu have decreased rapidly. I chose Redang Island and Perhentian Island as my study areas for this thesis because they are the islands which sea turtle visit most frequently. Children in these

islands have real life experience with the sea turtle. In Terengganu, adult turtles are not eaten by people but the eggs are used for food as with all species. Unfortunately, the strong demand for the eggs has led to the over-collection and over-consumption due to illegal harvesting and sale by non-licensed locals.

Perhentian Island Background

The Perhentian Islands (see Figure 1), which means 'Stopover Islands' in Malay is Terengganu's northernmost park. These island consists of Pulau Perhentian Besar ('Big Stopover' Island) and Pulau Perhentian Kecil ('Little Stopover' Island) with several smaller islets to the northwest. Perhentian Island is located 20km offshore by ferry from Kuala Besut, Terengganu. This archipelago is abounds with marvellous marine fishes, coral reefs and turtles. It ensures a great snorkelling and diving experience to tourists. Pulau Perhentian Kecil ('Little Stopover' Island) is home to the fishermen's village settlement which comprises over 120 houses of nearly 1000 people from my estimation. The school built up near the jetty and it has about 200 students. Pulau Perhentian Besar ('Big Stopover' Island) is gazetted as a Marine Park.

Figure 1: Perhentian Island and Redang Island



Source: Hotel Reservation Malaysia, 2004

Redang Island Background

Redang Island (Pulau Redang in Malay-see Figure 1) is located 45km from the mainland and can be reached by a 2 hour boat ride from the Marang Jetty. Redang Archipelago consists of 9 islands. The island is blessed with lovely white sandy beaches and crystal clear water. All these islands have been declared as Marine Parks. These islands have fringe coral reefs superior to any in Malaysia and rank as among the best in the world. Redang Island is homeland to approximately 250 families. All settlers around the whole island were moved to a

new village (Kampung Baru Pulau Redang) approximately 4 kilometers inland a few years ago. The state government built a school in the village. The school has about 240 students.

Why this topic was chosen

Two species of turtles - Hawksbill and Green Turtle - are reported to nest regularly on the beaches of the Perhentian islands, such as at Pasir Tiga Ruang and other beaches around the islands. Like Redang Island, nesting frequency has tremendously declined in recent years due to over-exploitation of turtle eggs, and incidental capture of the creatures in these water areas.

Threats to sea turtles occur at practically all stages in their life cycle. Today, Malaysia has experienced a serious decline in the numbers of turtles nesting to shores. The most serious nesting population declines have been observed of the Leatherback which has declined by 99% since the 1950s (Sharma & Salam, 1999). In those days, 10,000 nests were counted on the east coast beaches annually. In 2002, The Fisheries Department reported zero nesting for Leatherback turtle although officers from the Turtle and Marine Ecosystem Centre (TUMEC) insisted there were three nests but they were all poached (Chiew, 2003). Similarly, the nesting of Olive Ridley turtles has declined by 88% from 1984 to 1995. Similarly, it has been estimated that egg production by Green turtles in Peninsular Malaysia has declined by 65% in 32 years (1961-1993) (Sharma & Salam, 1999). According to Professor Chan Eng Heng's (a well known sea turtle scientist), analysis on the number of nestings from 1960 to 1990 had already showed a steady decline but zero-nesting of the Leatherbacks turtles had been anticipated and has actually come a year earlier than expected. "It is a disgrace that we are losing this species when in the 1960s Rantau Abang had the largest known population of Leatherbacks in the world," she said (Lau, 2003). Globally, the Giant Leatherback is the most endangered of all sea turtles due to heavy poaching and theft of eggs (Lau, 2003).

"Several populations of sea turtles in Malaysia are on the brink of collapse and could soon be extinct unless urgent action is taken" (South East Asian Biodiversity, 2004). Scientist pointed out one of the biggest problems in Malaysia is the harvesting of turtle eggs laid on the beaches. If hatchlings do make it to the open water they still face a myriad of threats from entanglement in fishing nets, illegal harvesting for food and shells, and the destruction of their feeding grounds. Therefore, in early September 2004, Terengganu state government made a decision to gazette three major nesting sites on Redang Island as turtle sanctuaries because avoiding losing its iconic Leatherback turtle to extinction (Chiew, 2004).

The local people on both islands primarily earned their living by traditional fishing and they harvest turtle eggs during nesting season generation to generation. Now most of these fishermen are entering the tourism industry that is growing rapidly on the island. The students whom finished primary school education (not continue studying to secondary school) prefer to work at the resorts on the island rather than continue with the fishing tradition of their forefathers. Most of the parents are not educated; they don't know what the meaning of *extinction* is. They do have sea turtle conservation works but the effects of complete egg harvests can never be recognized until whole generations of reproducing turtles are gone and there are no future generations to replace them. If no strict action is taken; this is essentially what has happened to the Leatherbacks of Terengganu. In this thesis I would like to see the

children's views about sea turtles and also to investigate the real possibilities in environmental (ecological) education or perhaps even better: education for sustainability.

Introduction to Education for Sustainable Development

Since the Rio Conference (UNCED) in 1992, Sustainable Development as a relevant notion, has been widely adopted. Sustainable Development was earlier established in international politics in the Brundtland UN report, "Our Common Future, The World Commission on Environment and Development" (1987). The Brundtland Commission had the following definition of "Sustainable development":

Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.

Consequently, the Environmental Education (EE), as a priority solution to achieve sustainability in the Rio Conference, was reoriented as Education for Sustainable Development (ESD) in the UNESCO Thessaloniki Conference on Environment in 1997, which is aimed at empowering the young generation to confronting the future environment and development challenges. Sustainable development gives us a much sharper time perspective, telling us that the choices we make today are inseparable from responsibility for future generations. Sustainable development to us also involves our relation to nature. The environmental problems and conflicts at stake are both global and touch upon all aspects of society. The World Summit on Sustainable Development in Johannesburg in 2002 stressed the three dimensions – ecological, economic and social – of sustainable development. Its plan of action provided for the integration of the three components of sustainable development – economic development, social development and environmental protection – as interdependent and mutually reinforcing pillars. Also, the Johannesburg Summit underscored the need to integrate sustainable development perspectives into educational systems at all levels, in order to promote education as a decisive factor for change. The UN Decade 2005-2015 on *Education for Sustainable Development (ESD)* was decided upon by the General Assembly in December 2002 and is already ready to start – January 1st 2005 (Wickenberg et al, 2004).

Young people and environment

Young people are important because they are the one integral the development of good environmental practices. Children are tomorrow's adults and thus the environment relies on them (future generations) taking care of it. Therefore, their values, knowledge, attitudes and perceptions of the future generation are crucially important. Their views and decisions will have the significant impact on their environment. Many studies have shown that people's environmental concern is greatly affected by positive experiences of the natural world acquired in childhood (e.g. Tanner, 1980; Palmer, 1993; Chawla, 1998). According to Chawla (1998), concern for the natural world is shaped through social learning. Interactions with the living environment and with other people in early childhood are the most important factors to shape their opinions. Chawla (1998) also described a child's concern for the natural world as an exchange between external and internal environments in which the external environment includes physical surroundings and the internal environment consists of the child's needs, abilities, emotions and interests. Environmental educators have also emphasized that one foundation for environmental awareness and action is children's sense of place (Hutchinson,

1998), which usually refers to an experientially based intimacy with the natural processes, community, and history of one's place (Sanger, 1997). From this thesis, I would like to see the children views, values and knowledge about sea turtles since both islands are the most target place for sea turtles comes ashore to nest during nesting season (May to September).

1.2. Aim, Objectives and Research Questions

Why and how is sustainable development then related to environment? Effective protection of the environment is one of the objective defined by The World Summit on Sustainable Development in Johannesburg (WSSD, 2002). It means:

"We must act to limit global environmental threats, such as climate change; to protect human health and safety from hazards such as poor air quality and toxic chemicals; and to protect things which people need or value, such as wildlife, landscapes and historic buildings" (WSSD, 2002).

Today, we see how environmental crises are addressed and there had been recommendations on the important role of education in addressing environmental concern. So, this shift to the adoption of sustainability as a focus of environmental education and consider the children and young people as essential agents to the future well being of our environment. The Aim of this thesis is to gain more knowledge of the possibilities education in Malaysia can have in the issue of the threatened sea turtles in the islands.

Objectives of this thesis

- (1) To investigate the level of ecological understanding of their environment among school children in Redang Island and Perhentian Island, Malaysia, in the case of sea turtle as an endangered species.
- (2) To find out the major problems and suggest recommendations to promote education for ecological understanding in both island.

1.3. Limitation of this thesis study

I have only been able to make my thesis field studies in the two mentioned islands in Malaysia and in their schools where the children are between 6 and 12 years of age. I have made a survey with questionnaires to 382 students in all. A total of 346 drawings were also collected from both schools. That is of course a relatively small sample of the young student population in Malaysian islands but big enough for this pilot study and this is to be continued later on when this master training course is to an end. My intention after that is to continue this work and bring it to new actions patterns for teachers and students in environmental education and education for sustainable development in Malaysia.

2. Methods and Theoretical Framework

2.1. Document studies – Literature, Laws and School Curriculum

As an introduction to my thesis work I read various literature – scientific books, articles and journals – of this issue on sea turtles and their endangered situation in Malaysia as well as in other parts of the world. I have also for many years been doing voluntary work with these crucial issues on some islands in Malaysia and learned a lot out of this. All this is a necessary foundation for my future work to find ways to make a change in this area. I have also been searching for relevant laws on this matter and then I had a relatively hard work to find the existing School Curricula and Syllabuses to be applied on this specific educational field. The document and literature review section could be listed in the following way:

- (a) School curricula - Science, Local Studies and Malay Language text book
- (b) Material of "Sea Turtle Camp" which prepared by SEATRU
- (c) Pedagogy of Science – The Primary School Science Curriculum in Malaysia
- (d) Laws of Malaysia – Education Act 1996 (Act 550) & Selected Regulations
- (e) Laws of Malaysia – Environmental Quality Act, 1974 (as amended)
- (f) Federal Legislation – Fisheries Act 1985 (Amended 1993), Protection of Wild Life Act 1972
- (g) State Legislation – Turtle Enactment 1951 (Amended 1978, 1989)
- (h) Journal of Environmental Education Research
- (i) Journal of Psychology of Education
- (j) International of Science Education
- (k) Books about Environmental Education and Sustainable Development
- (l) Marine Turtle Newsletter
- (m) WWF Malaysia report about sea turtle conservation
- (n) Department of Fisheries Malaysia – under Turtle Conservation Division
- (o) The Star (newspaper)
- (p) New Strait Times (newspaper)
- (q) Information from different organizations' web sites

In the next chapter (Ch.3) I will get back to the results of those documents after a narrow reading. I was trying to identify different types of norms and rules regarding sea turtles and their possible protections in the law books. There is an important difference between "law in books" and "law in action" – that is a difference between what is said we ought to do and then what we actually do in everyday actions, in our practice. My aim here is to identify these differences and than to continue to possible ways to offer changes in action.

2.2. Survey with students in the schools in the islands

Methods and Material

In order to address the objectives of this study, I carried out surveys of children in both island schools. The case study school is a Malay primary school and Malay Language was used in this research. The views of the children in the school were sampled by questionnaires, interviews and drawings from Pre school, Year 1 to Year 6 (382 pupils in total), where Redang Island primary school 221 pupils and Perhentian Island primary school 161 pupils. I made the interviews and filled up the questionnaire in groups of usually 2 or three people for Pre school, Year 1 to Year 4 pupils because their language of understanding and vocabulary was not yet developed enough to help them express themselves in written language. Year 5 and Year 6 pupils were given questionnaires to filled up themselves and they were interviewed in group (two or three people or sometime four to balance total class numbers) when they submit the questionnaire to me.

The conduct of the interviews

A major problem identified in interviews, particularly with children, includes that of fostering an atmosphere of trust and security so that the participants feel able to express themselves as fully as honestly as they are able to (Littledyke, 2004). These factors were considered important in my interviews to children in the school. So, I had planned the sections of my interviews as below:

Group interviews: usually two or three children in which they know each other well because it provided a greater sense of security than individual interviews. An important advantage is that creates the conditions for discussions which can be stimulate ideas and extend the conversation through peer interaction (Lewis, 1992). During the interviews each child was named by me saying "Thank you [name]" after their contribution so that I could identify them.

Introduction: A quiet empty classroom was used to minimize distractions from their peer. I arranged child-sized chairs around a table to signify non-dominance. The interview location was organized in advance and the children were collected from the classroom. Littledyke (2004) suggestion was used in my interviews where a friendly manner was essential to create a relaxed atmosphere and I lightly lowered my body posture to ensure that non-threatening signal to the children and some initial social chat I used to put the children at ease. The purpose of interview were explained (I am talking to children in your school to find out what you think about sea turtle) and the questionnaire paper were recorded (It will help me remember what you say).

Interview style and content: The contents of the questionnaire are:

1. Do you know how many species of sea turtles are nesting in Malaysia?
2. What does "extinction" mean?
3. Do you ever eat sea turtle eggs? If yes: Why? If no: Why not?
4. Did you throw plastic bags or rubbish into the sea? If yes: Why do you do that?
If no: Why not?

5. Have you seen a dead turtle before? If yes: What is your feeling?
6. Where in the world does the sea turtle travel?
7. What can you do to help sea turtles?
8. Do you like sea turtles? Why?

The interviews were approximately 25 minutes long. The structure was kept flexible and the questions and dialogue were made as responsive to the children as possible. Littledyke (2004) stressed that interviewing style was one of a non-judgemental active listener with question designed to draw out their attitudes and views. It can be achieved by avoiding use of technical terms, unless they were introduced by the children; and using the language range familiar to the particular children involved. Therefore, I tried to use appropriate language matched to their age and the ability of children to get involved in the interview was essential to ensure good communication and to find out about the children's views on their own terms.

The conduct of drawings

Besides using questionnaires and interviews, I also used children's drawing to see what they think about sea turtles during the school art class. Children's drawings are useful tools in providing valuable information for the assessment of children's environmental perceptions (Barraza, 1999).

Drawing techniques provide a relatively easy way to gather social information from and about children (King, 1995). The use of drawings for evaluation purposes is a powerful tool, since most children tend to enjoy drawing without showing any sign of tension. While many children dislike answering questions, drawing tests can be completed quickly, easily and in an enjoyable way (Lewis & Greene, 1983). According to Chambers (1983), drawings avoid linguistic barriers and enable comparisons between groups of different languages and abilities. Crook (1985) argues that 'it is widely recognised that the content of children's drawings may provide insight into their feelings and thoughts about the world'. Children's drawings provide a 'window' into their thoughts and feelings, mainly because they reflect an image of his/her own mind (Thomas & Silk, 1990). Luquet's classification of drawing development has been important because of its influence on the subsequent work of Piaget, for whom drawing has a significant role in promoting cognitive development (Barraza, 1999). According to Luquet (1913) and Piaget (1969), there is a parallelism between the child's intellectual development and their drawing development. As children grow older their drawings become more detailed, better proportioned and more realistic.

Drawings Collection

A total of 346 drawings were collected from both schools. All drawings in each school were made during a single session, which lasted between 45 minutes. There was no discussion before the session, except to introduce the activity [Good morning students, we will draw sea turtles today; you can draw anything you like about sea turtles.] This is to determine that if children perceived a problem and it would be depicted in their drawings. Furthermore, additional information was gathered by interviewing the children (selected pupils) when they finished their drawings.

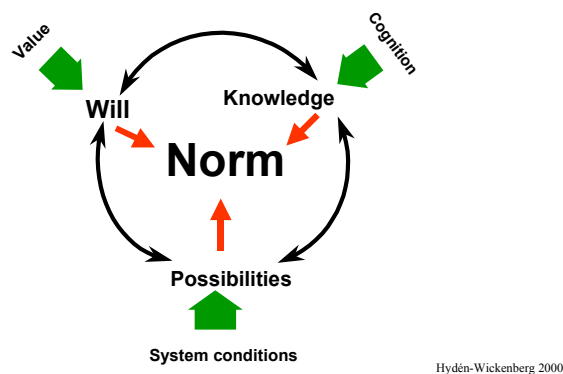
2.3. Interviews with key persons – teachers, fishermen, officers

Teachers, villagers, fishermen and Curriculum Development Centre's officers were also interviewed to establish their views and perspectives on science and environmental education to determine the educational influences on the children. Villagers and fishermen were willing to be interviewed at any length of time and generally seemed to be very open. Most of interviews took place in an informal setting. All interviews took place during September 2004. Additional information was obtained through direct observation.

2.4. Norm Model as an Analytical Tool

The model I would like to use in this paper is “The Norm Triad” (Hydén, 1998). The reason for that is to see the flow of my research and to analyse the results. The norm concept is the point of departure in order to be able to interpret and understand the actions and action patterns of individuals, groups and organisations. By ‘norm’ in this thesis, I refer to ‘action directives’ or ‘action direction’. The norms could be social norms, ethical/moral norms, economical norms, ecological norms, and technical norms. The social norms are often not seen or visible and something that is within or under the action pattern. The Norm (see Figure 2) has three main dimensions or aspects: Knowledge; Will & Value; and Possibilities or Systemic Conditions.

Figure 2: The Norm Triad



The point of departure being to methodically start from an action, or maybe rather a habitual action pattern (Hydén, 1998 & 2002; Wickenberg, 1999/2004; Baier, 2003). In other words, it use as an instrument or a tool to analyse, interpret and understand under what circumstances the environmental theme (here: sea turtle as an endangered species) has been established with adult and children as key actors on both islands in Malaysia in this thesis.

I used questionnaires to children and interviewing teachers, islanders, fishermen and education officers to see their norms and normative actions as tools for the 'norm triad' regarding the sea turtles issue. I wish to use this norm triad to present the results “what and why it happen now” and using back the same theory to recommend “what and why it should change in future”.

My research target was children on the island. They are the future of the island and they are the one who will directly develop the island. So, the schools has an advantageous, gradually developed opportunity to use its 'educational infrastructure' for the training of environmentally correct activity patterns and enforcement of norms related to a healthy life environment and sustainable development (Wickenberg, 2004).

According to Wickenberg (2004), norms created in the 'Lifeworld' and brought into the professional school atmosphere ('System') play the most important part in the communication and activity relating to environmental work in school. The norms used by the System for environmental schoolwork are relatively unknown for the key actors, but on an intuitive (cognitive-emotional) meta level they form a moral background or “life belt of legitimacy” for the key actors' normative environmentally related work in school. However, the normative contents of the professional (the everyday pedagogical tools) goal and policy statements' (the curriculum and syllabus) are well established with the key actors. The meeting of these normative systems of activity carries great weight for the development of environmental pedagogy in school.

Phronesis is a Greek which origin word meaning "knowledge". Wickenberg (1999/2004) described that Phronesis, one of Aristotle's knowledge forms (intellectual virtues), which has received new found attention in neo-aristotelian ethic, centers around judgment and is a practical knowledge closely related to norms, activities and activity patterns. He points out Phronesis is an active knowledge - or wisdom in practice – viewing action as a goal in and of itself. Wickenberg stated that “Phronesis” is the best description of the process of change that characterises the school's relationship with work on environmental issues. So, teachers and conservationist could play an important role here because there are given a framework and good norms for new and changing action patterns shown to the young generation islanders.

Wickenberg (2004) identified ethics represents a concept of great weight for the key actors dealing with environmental activities. He described that the environmentally related activities and activity patterns of adults also form ethical models for the creation norms. Moral-ethics, values, and desire-will form the third pillar of the norm.

In next chapter (Ch. 3) I will get back to and use this model in analysing and interpreting my empirical material obtained from the schools in the two islands.

2.5. Scientific knowledge & ecological knowledge on sustainability

Helldén (1995) argued that pupil conceptions of matter and its transformations can be used as a starting point in the environmental education. He pointed out that teaching strategy can help

pupils develop a better understanding of the carbon cycle and the cycles of other elements would give them a better understanding of important environmental issues in the future. Ekborg (2002) has identified photosynthesis, respiration, decomposition, combustion, materials, energy, and cycles as important scientific concepts for understanding environmental issues.

Ecological knowledge as one part of education for sustainability

To encourage children learn and care about their environment, it necessary let them to experience the natural environment itself. At the same time, they need someone to give a clear definition and explanation about basic ecological concept to achieve a better understanding.

Nyberg (2004) points out study life cycles of different organisms in a planned and structured way is a good start learning about sustainability. Working with living organisms is a fruitful start in the process of getting interested in and to understand more of ecosystems and their vulnerability. Therefore, children as well as grown up become fascinated when they get aware of all the different organisms they can see in a small pond, in a piece of litter or by the shore.

No matter what kind of environmental issues bring up to discuss, it require scientific and ecological knowledge to be fully understood. Pupils need to develop a conceptual understanding. Ekborg (2004) states that concepts have been constructed to better help us to understand the world around us. Conceptual understanding goes beyond explaining the concept itself. It is also includes the ability to explain phenomena such as where matter goes in shrinking compost heap and to draw upon this knowledge when discussing a socio-scientific issue. Students and teachers need to develop this knowledge. She also mentioned that the understanding of scientific concepts help

3. Empirical Material and Results

3.1. Studies of Scientific Literature on Sea turtles

Terengganu, Malaysia - SEATRU (Sea Turtle Research Unit)

SEATRU is an acronym for the Sea Turtle Research Unit of the Faculty of Science and Technology, University College of Science and Technology Malaysia (KUSTEM). SEATRU is aimed at stopping the extinction of turtles in Malaysia. It works by researching and gathering as much as data as possible on these ancient creatures that have roamed the Earth's surface for million of years (Chiew, 2000a). SEATRU was formed in 1984. It's set up by two marine biologist lecturers, Mr. Liew Hock Chark and his wife Professor Chan Eng Heng.

SEATRU study, which used a combination of telemetry and time depth recorders, resulted in the establishment of an offshore sanctuary for the Leatherbacks, a place where destructive fishing gear known to entrap turtles was prohibited during the nesting season (Chiew, 2000a). Today, SEATRU is determined to save the threatened populations of Green and Hawksbill turtles. SEATRU recommended to the State Turtle Sanctuary Advisory Council and the Department of Fisheries that sanctuary status be accorded to the vital nesting sites of the two

species. The first protected site was established at Mak Kepit beach on the western of Pulau Redang, Terengganu in 1992. This prompted Chan to urge the adoption of in-situ incubation at Mak kepit (Chiew, 2000a).

That famous conservation battlecry, “Extinction is forever”, held new meaning then for Liew and Chan. In 1990, they move onto researching Green turtles at Chagar Hutang, Pulau Redang (off the Terengganu coast), and saw how eggs deposited the night before were gone on the next day, collected by the villagers. Would Green turtles follow the Leatherbacks into the extinction?

The saddest part was the eggs were being exploited by *licensed collectors* at Chagar Hutang (also known as Turtle Bay) had been leased by the Terengganu Government to a village cooperative on Pulau Redang as a source of income (Chiew, 2000a). They have made many appeals over the last few years to the local government to stop issuing licences for turtle egg collection. Unfortunately, they realized that the appeals were not having an effect. So, they raised funds to help buy the eggs from the licensed egg collectors for incubation at Chagar Hutan Beach, the main nesting beach in Redang.

SEATRU take their next step: a research programme which included a long term tagging project, in-situ incubation – when eggs are left to hatch naturally in their nests to ensure a higher success rate than when eggs are removed and incubated artificially and tracking studies.

Other conservation efforts SEATRU undertakes on Redang Island include monitoring turtle stranding, beach and underwater cleaned up which includes removing discarded fishing nets that can trap and drown turtles (Chiew, 2000a). The couple estimate that over 250,000 eggs have been saved at Redang Island's Chagar Hutan beach since they started, with some 200,000 hatchlings return to the wild – sea (Chiew, 2001). Similar egg rescue schemes are being piloted elsewhere in Malaysia by the Malaysian Department of Fisheries and the World Wide Fund for Nature. They received the United Nations Environment Award in 2001 for their outstanding contributions to save turtle eggs on Redang Island, Terengganu .

Sea turtle research at KUSTEM has since 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 (SEATRU, 2004). The vital information resulting from these studies have formed the basis for many important recommendations made by SEATRU to relevant government agencies for the conservation of sea turtles, especially within the state of Terengganu (SEATRU, 2004).

Besides carrying out conservation-oriented research on sea turtles, SEATRU is also directly involved in education of university students at the undergraduate and graduate levels, village 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.

Redang Island, Malaysia - Turtle Camps by SEATRU ("Kem Si Penyu")

SEATRU developed an education programme targeting Redang Island Primary School since 1997. Turtle Camps called "Kem Si Penyu" for the children of the fishing village at Redang Island during the nesting season. The cost to the beach sponsored by Berjaya Redang Beach Resort. The Year 5 pupils going to Chagar Hutan beach in small groups of about ten per session to spend two days and one night on the beach. Here, they 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. Professor Chan points out in the long run she hopes every kid on the island would have a chance to participate in the camps at least once during their primary education. SEATRU believes strongly in education at the grassroots level can shape good behaviour and actions towards the environment in future.

3.2. Laws of Malaysia on Sea Turtles and Egg collection

(i) Marine Turtle Legislation

The continues decline in marine turtle populations over the past decades, later prompted relevant State authorities to draft legislation to provide legal protection to adults turtles and to regulate the exploitation of their eggs (Sharma & Salam, 1999). Terengganu State promulgates The Turtle Enactment 1951 to prohibit the killing of marine turtles and control the collection of marine turtle eggs.

At Federal level, there are two Acts that relate to the protection and conservation of marine turtles. They are the Protection of Wild Life Act 1972 and Fisheries Act 1985 (Amended 1993).

The Protection of Wild Life Act 1972: Applicable only to Malaysia, this Act affords protection to wild animals (mammals, birds, reptiles and insects) but does not include fishes, turtles and amphibians in its exhaustive schedules of protected, totally protected or game animals.

The Fisheries Act 1985: This Act which covers the entire country contains provision for conservation, management and development of turtles as a resource. This Act empowers State authorities to formulate their own rules and regulations with regard to turtles and inland fisheries.

Eleven States in Peninsular Malaysia, currently six have laws to protect turtles (Kelantan, Terengganu, Johor, Melaka, Negeri Sembilan and Kedah; three (Pahang, Penang and Perak) have draft documents in review for many years but no result yet; two (Perlis and Selangor) lack any legislation at all (see Table 2). Similarly, Sabah and Sarawak, which can enact legislation autonomously, have laws that also concentrate on exploitation rather than conservation. For instance, Sabah's Fauna Conservation Ordinance 1963 deals mainly with licensing to hunt turtles, collect their eggs and farm them; in Sarawak, the Wild Life Protection Ordinance 1990 permits exploitation (Chiew, 2000b).

Although the jurisdiction over the conservation, protection and management of marine turtles in peninsular Malaysia is under the various State governments, the implementation and enforcement of the law are carried out by Federal agencies, which is the Department of Fisheries Malaysia (DoFM) and the Department of Wildlife and National Parks (DWNP). For Sabah and Sarawak, the agencies involved are Sabah Parks, Sarawak Forestry Department (the National Parks and Wild life Office) and Sarawak State Museum.

Table 2: Legislation regarding the protection, conservation and management of marine turtles and terrappins in Malaysia.

State / Federal	Legislation	Provision
FEDERAL	Fisheries Act 1985 (Amended 1993) Protection of Wild Life Act 1972	1,3 -
PERLIS	No legislation	-
KEDAH	Turtle Enactment 1972 Turtle's Rules 1975	1,2,3,4,5 -
PENANG	Legislation in draft	
PERAK	River Rights Enactment 1915 Legislation in draft	1,2
SELANGOR	No legislation	
NEGERI SEMBILAN	Fisheries (Turtle and Turtles' Eggs) Rules 1976	1,2,3,4,5
MELAKA	Fisheries (Turtle and Turtles' Eggs) Rules 1989	1,2,3,4,5
JOHOR	Fisheries (Turtle and Turtles' Eggs) Rules 1984	1,2,3,4,5
PAHANG	Fisheries Enactment 1937 Fisheries Rules 1938 Legislation in draft	
TERENGGANU	Turtle Enactment 1951 (Amended 1978) Turtle Enactment 1951 (Amended 1989)	1,2,3,4,5
KELANTAN	Fisheries (Turtle and Turtles' Eggs) Rules 1978	2
SABAH	Wildlife Ordinance 1997 Wildlife Regulation 1998	
SARAWAK	Wildlife protection Ordinance 1990 Turtle trust Ordinance 1957	1,2,3 1,2

Source: Gregory and Sharma, 1996

- Notes:
- 1 - Illegal killing or possession of turtles
 - 2 - Turtle egg removal or destruction
 - 3 - Disturb nesting or cause physical injury
 - 4 - Illegal operation of turtle watching sites
 - 5 - Failure to furnish turtle statistics

(ii) Regional Turtle Act and Enforcement.

Traffic and WWF combat Hawksbill turtle trade in Southeast Asia

TRAFFIC is investigating the status of trade and stockpiles of Bekko in two traditionally key countries involved in the trade — Indonesia and Vietnam. TRAFFIC and WWF will continue to work with government partners in both countries on this issue (WWF, 2004).

Turtle Task Forces

The Turtle Task Forces, WWF and the Bali government have collaborated on many recent initiatives to curb the consumption level and provide alternatives, including developing a national action plan and local turtle monitoring (WWF, 2004). According to WWF (2004), the numbers of turtles traded per month were reduced to almost half the previous levels (600 per month as opposed to over 1,300 the previous year) in 2001 and 2002. So, WWF is now concentrating on developing a sustainable financing scheme for the Turtle Task Forces, protected areas for critical habitats and a network of turtle based tourism that includes Bali, Berau and East Java (WWF, 2004). WWF also work with the government and several other conservation organizations are working towards a target of 90% reduction of current green turtle trade levels by 2005.

(iii) International Law

Some regulations affecting sea turtles are global in scope. The Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES) regulates international trade in endangered and threatened species. Sea turtles are covered under Appendix I of this agreement and ostensibly receive protection from international import and export by all countries that have signed the treaty although compliance and enforcement leave something to be desired (Ripple, 1996). The Convention on the conservation of Migratory Species of Wild Animals focuses on endangered species that between countries such as sea turtle. This conventions provides a framework on which to base future conservation agreements, as well as mechanism for governments to unilaterally conserve endangered migratory species (Ripple, 1996).

Summary of Law on Sea Turtles

- (a) Current laws do not offer fully protection to sea turtles. It's always emphasize commercial exploitation of eggs and it state out it can be solved through a licensed egg collection system and the operation patrolling of sea turtles nesting and watching areas. But it doesn't works, we still can see eggs are bootlegged out on cars, motor cycles, in speedboats and sold in the coastal town, morning and night open wet markets, even in the Terengganu State metropolitan (Kuala Terengganu) and clandestinely. According to Chan (1991), the turtle eggs that are sold usually contain life in the form of a developing embryo. The embryo develops rapidly and within 10 days, a pumping heart forms and can be easily seen. It is unlike eating chicken eggs which often has no embryo, so eating turtle eggs is seem like eating a living turtle. The licensed egg collection system doesn't promise sea turtles a better future. Illegal egg collection is rampant in Terengganu State. Monitoring and enforcement of regulations are so poor. Most of the time, the licensed egg collectors are not honestly. They often sent or sold a fraction of turtle eggs to hatchery and the remaining eggs were sold in the market because it is profitable. Unfortunately, current science informs that at least 70% of all eggs laid annually have to be incubated for hatchling production if a healthy turtle population is to be maintained (Sharma & Salam, 1999).

- (b) Current laws do not ban the consumption and commercial sale for all sea turtles eggs. So far only the Leatherbacks turtle eggs are banned for consumption and commercial sale in Terengganu and Pahang State.
- (c) Current laws have provision to protect and prevent cruelty to sea turtles during the nesting period and to prevent accidental deaths due to capture fisheries activities. Sadly, the lack of manpower and resources prevent effective enforcement which is conducted by government agencies. They seldom come to the islands to monitor and spot check the turtle nesting areas.
- (d) Current laws are inconsistent among the various States.
- (e) Traditionally, the management and protection of marine turtle fall in jurisdiction under Department of Fisheries in Malaysia and Department of Wildlife and National Parks respectively. However, there exist conflicts over jurisdiction scope between the agencies (Sharma & Salam, 1999). There is also lack of co-ordination between government agencies responsible for development and agencies that promote conservation of sea turtles.
- (f) Current laws do not cover the protection of all nesting and feeding areas.

3.3. The Primary School Science Curriculum in Malaysia

Introduction

Science as a subject for Level Two (Years 4,5,6) was introduced in primary schools in 1995. However, many people are in opinion that Science needs to be introduced at an earlier age. It was decided that Science be taught as a subject in Level One (Years 1,2,3) commencing 2003. By the time school reopened in January 2003, all systems were ready for the implementation of teaching Science and Mathematics in English.

Integrated Curriculum for Primary School (KBSR)

The Integrated Curriculum for Primary School, which is popularly known as KBSR (Kurikulum Bersepadu Sekolah Rendah) was introduced in 1993. As implied by its name, the main thrust of KBSR is the concept of integration. Among the elements integrated across the curriculum are basic skills, knowledge and values; language; environmental education; science and technology; patriotism; thinking skills and study skills (Poh, 2003). According to Poh (2003), they have five aspects of integration, namely Enhancing Thinking Skills, Infusing Values across the Curriculum, Teaching Language across the Curriculum, Teaching Science and Technology across the Curriculum, and Teaching Environmental Education across the Curriculum in KBSR.

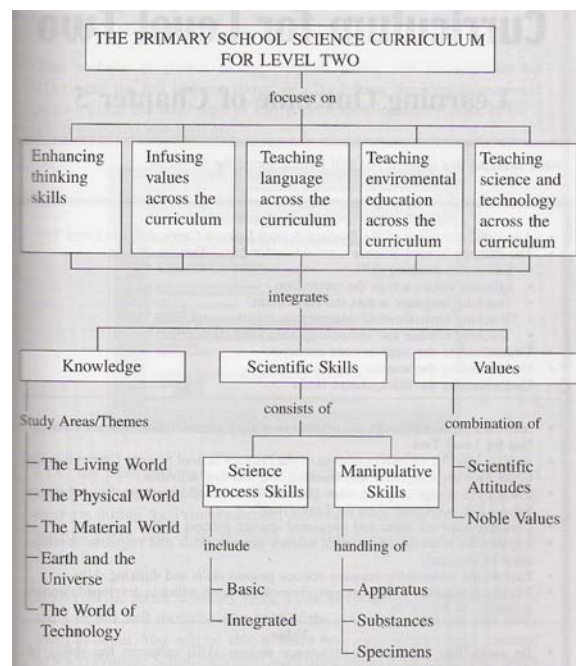
I want to define Teaching Environmental Education across the Curriculum aspect. Environmental education has been made an element to be integrated across the curriculum because it is apparent in all subjects taught in schools. According to Poh (2003), the teaching

learning strategy for education across the curriculum emphasises the following learning stages:

1. Awareness : Arouse student's awareness of environmental issues and problems.
2. Knowledge : Expose students to basic knowledge and concepts as well as help them understand the relationship between various environmental components.
3. Attitudes : Inculcate social attitudes and values so to live in harmony with the environment.
4. Skills: Enhance students' problem-solving and decision making skills on environmental issues.
5. Involvement : Encourage a responsible attitude towards the environment through activities involving students.

The Primary School Science Curriculum (KBSR) state that science is made up by three important components, which are process, product and attitude to develop human beings who are knowledgeable, skilful and good character (see Figure 3).

Figure 3: The Primary School Science Curriculum for Level Two when (it was developed by the Curriculum Development Centre).



Source: Poh, 2003

Malay Language text book

There is a text about sea turtles under marine life in the Malay Language Years 5 syllabus. The title of the passage is Sea Turtles at Turtle Island, Malaysia. The content of the text is as below:

“Forty pupils and three teachers visited Turtle Island as their study trip. Mr. Muluk, an officer of the Turtle Research Centre at hatcheries, welcomed them. Mr. Muluk said turtle

eggs were collected and send to the nearest hatchery for eggs incubation. Caretaker replants eggs. The hatchery was fenced with high barbed wire to prevent trespassing and to protect turtle eggs from predators such as rats. The incubation period takes 50-60 days. The hatchling will be released after emerged. According to Mr.Muluk ,not all hatchlings could survive because most of them died from predation by circling birds and crabs or dehydration in the heat.

They were brought to see sea turtles' nesting. Mr. Muluk said sea turtles only come ashore to lay their eggs on the quiet night. A female turtle digs an egg cavity before laying eggs. The egg chamber is approximately 75 centimetre deep and it takes a few hours. Sahimah, 10 years old pupil said that there is nothing happier than to see turtle comes ashore and nesting. She and his classmates had a chance to see a green turtle coming ashore at 11:15 P.M. Mr.Muluk said when she began to lay eggs, a kind of liquid known as 'mucus' shed out from her eyes to wash her sandy eyes. This is the reason why many people believe that turtles are crying while they are laying eggs. The green turtle laid 96 eggs. The eggs looked like ping-pong balls. Then, she covered the eggs with sand and the nest was thoroughly concealed and much harder for predators to find the eggs. Finally, the female turtle crawls back slowly to the sea. Mr.Abdul Latif, 45 years old, one of the teachers said this study trip gave them a lot of new knowledge about sea turtles, which is one of the protected species from extinction.

From the above Malay Language text, it helps children learn about general description of sea turtles nesting, incubation and emergence. This text only explains sea turtles natural threats, however, sea turtles face a series of life and death obstacles to their survival where the predators such as rats, raccoons, crabs and ants raid eggs and hatchlings still in the nest. Once they emerge, hatchlings make bite-sized meals for birds, crabs and a host of predators in the ocean.

The human caused threat does not explained in the text. Furthermore, in the text had given one wrong information, which is “when she began to lay eggs, a kind of liquid known as 'mucus' shed out from her eyes to wash her sandy eyes. Actually, the correct fact is nesting sea turtles appear to shed tears; the reason is the turtle just secreting salt that accumulated in her body, not washing their sandy eyes.

One interesting question is found in the “Questions and Answer” section for children after they taught by their teacher about this topic. The question is “*If you see sea turtles entangled in your fishing nets, what will you do?*” This is a very good brainstorm question that they can do to help preserve and create healthy habitat for animals. Most of the children's fathers in this both islands are fishermen. They have very high possibility to see sea turtles entangled in fishing nets which can cause them to drown. So, they can save the drowning turtles if they see it. Hence, shrimp nets also can cause sea turtle to drown. Actually, it depends on the teacher explanation and interpretation about this turtle issue.

Science subject in the syllabus

Pupils only learn what does extinction mean and conservation topics in Year 6 (12 years old). Sea turtles issue is in the chapter of “Interacting between living things” under the theme “Investigating the Living World”. The contents of this chapter are human beings has

responsibility to play a role to preserve and protect animals and plants, what does endangered mean for flora and fauna, efforts in action such as preserving and conservation. Definition of preserving and protecting define clearly to develop pupils thinking, instil a positive attitude in using knowledge and skills in solving problems and issues related to self, society and environment.

The sea turtles issue which is discussed in this chapter are:

- (a) What does it mean to be an endangered species?
- (b) What does extinction mean?
- (c) What is the problem lead sea turtles becomes endangered species?
- (d) What can be done to help sea turtles from extinction?

Human caused threats are bring up to discuss such as people over-harvested sea turtle eggs for consumption around the world including Malaysia and some countries even adult sea turtles are harvested for their meat. Then, the message what can be done to help sea turtles are fence up the beaches where turtles comes to ashore, collect the turtle eggs and incubate its in hatchery before released the hatchling to the sea.

Local Studies (Kajian Tempatan) in the syllabus

Local Studies, which were first taught in the school year 1994/1995 for Year 4,5,6 pupils with implementation of the Integrated Curriculum for Primary School (KBSR). The syllabus aims to create children the awareness that man needs to live in harmony with his environment. According to Poh (2003), this balance is important to ensure continuous happiness and stability. Thus, this subject aims to enable children to function effectively in their society and physical environment, as well as to instil in them characteristics that reflect the national identity in line with the principles of "Rukunegara". Furthermore, the syllabus sets out to convey knowledge, understanding, awareness, appreciation, and sensitivity towards man, society and his surroundings, including related issues and phenomena. Beside this, it aim to develop the skills of understanding and solving problems that might crop up from time to time (Poh, 2003).

Sea turtles issue is under the theme of "Society and natural environment maintain their prosperity and stability through various process". The chapter emphasis the importance of maintaining social stability, natural balance and conservation of environment. Hence, man is responsible for the restoration of the environment. The contents of this issue are:

- (a) Teacher leads pupils to discuss what the attitudes of tourists are during the "Turtle Watching".
- (b) The natural obstacles are discussed which faced by young and adult sea turtles are staggering, but the increasing threats caused by humans that are driving them to extinction.
- (c) Two suggestions are discussed how to protect sea turtles. They are "Ban to take away turtle eggs" and "Set up a hatchery".

During the discussion, pupils can see from the pictures and give ideas what they can do and what they can't do during the turtle watching such as (i) Stay clear and out of sight of the turtle until she begins laying eggs, otherwise we may scare her back into the sea (ii) Do not take pictures using flashes because the light may cause the female to abort the nesting process (iii) Do not handle or ride the sea turtles because we may injure the turtle or cause her to leave without finishing laying eggs.

3.4. Results from the Redang Island “Sea Turtles Camp” materials

Redang Island Year 5 pupils spent their two days one night at Chagar Hutan beach in Redang Island, a sea turtles protected areas. Sea turtle colouring book was used in this camp. This children's colouring book aims to promote awareness and love for sea turtles among children. This book is bilingual with text in Malay Language and English. It is produced by University College of Science and Technology Malaysia, KUSTEM and sponsored by ESSO Production Malaysia Incorporated. Every kid has given free to have this book. The information in this book is so condensed and easy to understand with the nice illustrations and interesting texts about the life cycle of sea turtle. The contents can be summarized as below:

- (i) introduction of sea turtles
- (ii) species of the world
- (iii) species nesting in Malaysia
- (iv) classification and shell patterns
- (v) general behavior
- (vi) nesting, incubation and emergence process
- (vii) migration
- (viii) threats and conservation

The children were not only introduced to facts in the colouring book, they also have hands on turtles conservation activities. The children had observed the whole nesting process at night. All of them knew that the sea turtle is a great and fast swimmer in the sea but she is slow and clumsy on the land. They saw a turtle pull herself from the water and crawl slowly to the beach, leaving a trail as she moved. They can see very close she digs out a pit with her hind flippers. When the egg chamber is deep enough, she begins to lay eggs. After laying about 100 soft-shelled eggs into the egg chamber, she covers it with sand. She flings more sand around the nest to hide it from predators. She crawls slowly back to the sea when she completes filling sand.

The incubation period takes 50—60 days under normal condition and it depend on temperature. A few days before the emergence, each nest is surrounded by a 45cm diameter chicken mesh to a height of 20cm. Hatchlings usually emerge after sunset when the surface sand temperature have dropped. When the hatchlings emerging from a nest, the number of hatchlings from each nest is recorded, children are allowed to release them to the sea at night.

Another important point is children are taught never throw garbage especially plastic bags on beaches and into the sea. They get the explanation about sea turtles will misunderstood plastic bags which float in the sea look like jellyfish (favourite food of the leatherback). They often eat them and these plastic bags can block up the intestines of the turtle and it is very dangerous for them. Many turtles have died from eating plastic bags. The children are encouraged to practice throw garbage to the dustbin. They also get explanation about why sea turtles were killed in fishing nets. "Many fishermen catch fish in the shallow sea where turtles come in from the oceans during the nesting seasons. When fishing nets are dragged for long hours under the sea, fish as well as turtles are caught. When the turtles are trapped in the fishing nets, they can not swim up to breathe. They can not breathe like fish. Many will drown in the fishing nets. This is one of the reasons why so few turtles remain today" (Chan, 1988).

Here, I would like to quote the threats and conservations explanation by Chan (1988) from the Malaysia Sea Turtle colouring book to see how its educate and influence the children's views after participate the camp.

Sea turtle eggs

"Very few turtle eggs of sea turtle have a chance to hatch. As soon as the turtle lays the eggs they are taken by egg collectors. These eggs are sold in markets and restaurants at a very high price. Each egg is sold 10 times more than the price of a chicken egg. If all turtle eggs are collected, sold and eaten, how can we get a baby turtles to grow into adult turtles which can return to our beaches to lay eggs?" (Chan, 1988)

No chance to nest

"A turtle is a shy animal. She needs peace and quiet to build her nest and lay eggs. But tourists do not allow her to lay eggs in peace. Hundreds of them crowd around her as soon as she crawls up from the water. They shine torches and flash camera lightly direct on her eyes. Some of them are very cruel to the helpless turtle. They jump on her back, pull her flippers and throw sand into her eyes. How can the poor turtle lay her eggs? She will return to the sea and may never come back again" (Chan, 1988).

Disturbances on the beach

"Tourists flock to the turtle beaches by the thousands to watch turtles make their nests and lay eggs. While waiting for a turtle to land, tourists make a lot of noise. They build campfires, play music, sing, dance and shine powerful torches on the beach. Turtles will not come to beaches where there are so many disturbances. They will look for another beach. Perhaps they will find a quiet beach in another country" (Chan, 1988).

No place to nest

"Many turtles do not return to the beaches which they visited before. This is because people are now using their nesting beaches. People built high-rise hotels and houses on these beaches. Many traders set up shops and stalls on the beaches during the day as well as at night. The shallow waters are used for water sports. There are motorboats; people wind surfing and other kinds of sport activities. These activities disturb the turtle when they nest at night and when they are resting in the shallow waters near the nesting beach during the day. If their nesting habits are continually being disturbed, we may never see turtles again" (Chan, 1988).

Sea turtle hatchery

“A hatchery is a fenced off area on the beach. Here, turtle eggs, which have been taken from the natural nests, are reburied in sand nests so that they can develop and hatch into baby turtles. The baby turtle hatch and crawl slowly up to the surface of the sand-nest. They are then allowed to crawl towards the sea. Some of them will return one day as adults and lays eggs. It is very important that we have hatcheries for turtles. Hatcheries give protection to the eggs and prevent people as well as animals from stealing them. Without hatcheries, not a single egg laid will have the chance to become a baby turtle” (Chan, 1988).

The hatchlings

A baby turtle, which has just emerged from its nest, is called a hatchling. It takes about two months for a hatchling to develop from the egg. Hatchlings usually emerge from the sand at night as the hot strong sun can kill them. They will find their way to the sea. Out in the sea they have to care for themselves. Very often they are eaten by birds or sharks and other big fish. However, turtle have survived for millions of years in spite of these natural dangers. Nowadays, one of the biggest dangers faced by hatchlings is marine pollution which is caused by man. Maybe one hatchling out of a thousand which find their way to the sea will return to the beach one day as a mother turtle to lay eggs” (Chan, 1988).

We can help save our sea turtles

“Because of the many dangers they face, sea turtles may become extinct one day. But fortunately they can be saved. People must learn to love sea turtles and care about them. You can help in the conservation of sea turtles. When you have a chance to visit a turtle beach remember these simple points:

- Sit quietly in the dark while waiting for turtles to come ashore.
 - Do not build campfires
 - Do not shine torches on the beach
 - Do not sing, dance or play music
- Allow turtle to nest undisturbed. Be kind to the gentle, helpless turtles.
 - Do not flash light into her eyes
 - Do not crowd around her
 - Do not ride her
 - Do not pull her flippers
 - Do not kick her
 - Discourage others from torturing her
- Allow turtle to return to the sea undisturbed after she has finished laying her eggs and completed her nesting.
- Do not throw rubbish on the beach” (Chan, 1988).

3.5. Results from surveys in the schools**3.5.1. Questionnaire studies**

I made 382 questionnaires and interviews of school children from 6 years old to 12 years old. They were 221 pupils from Redang Island Primary School and 161 pupils from Perhentian Island Primary School. They had some form of environmental education in their curricula.

Eight questions related to sea turtles (see above p.13-14) were asked and the pupils answered in their own words in Malay Language and the answers were translated to English. The children's answers of both islands are presented as below:

3.5.2. Redang Island Primary School Report

Question 1: Do you know how many species of sea turtle nesting in Malaysia?

The answer of this question is four species. Only 35% of pupils answered correctly, most of them were Year 5 and Year 6 pupils. 31% of pupils didn't know the answer and 34% of pupils gave a wrong answer.

Question 2: What does "extinction" mean?

28% of the pupils described extinction as "being dead", "no longer in exist" or "when species of animals disappear from the planet". 6% of them defines it "as reduction in a given population" while 66% of pupils didn't know what it means.

Question 3: Do you ever eaten sea turtle eggs?

Almost the whole school children (97%) had experienced eating turtle eggs, only 6 pupils (3%) had never tried eating it before because their fathers didn't bring it home and they don't want to try. On average, their father/parents collected the eggs from the beaches or bought it from the wet market. Those children said, "the turtle eggs were delicious". 72% of the pupils would like to eat turtle eggs again and 5% said that turtle eggs were their favourite food. Only 23% answered "I don't want to eat and try anymore".

Question 4: Did you throw plastic bags or rubbish into the sea? If yes, why do you do that? If no, why not?

82% of the pupils answered "Yes" and the excuses they gave were "I followed what my parents did" (62%); "there is no dustbin" (17%); "fishes would eat the rubbish"; "I am lazy to throw into dustbin" and "I just do whatever I like". 18 % of them answered "No" and the reasons given were "my father told me I can't do that"; "I throw it into dustbin"; "it pollutes our sea and if the sea is contaminated, fishes and sea turtles would die".

Question 5: Have you seen a dead turtle before? If yes, what is your feeling?

65% of children had seen dead turtles before, it can be carcass of adult turtle or hatchling (juvenile turtles). 58% of them felt sad when they saw dead turtles while 7% of them were happy to see dead turtles and the remaining 35% hadn't seen dead turtle till today.

Question 6: Where in the world does the sea turtle travel?

With regards to the destination of the sea turtles travel, 75% of the children's' answers were at sea; 7% at beaches, 2% at marine park and jetty; 6% of them answered that they had found somewhere to lay eggs; 10% of pupils didn't know where does it travel.

Question 7: What can you do to help sea turtles?

Various of answers were given by children such as "feeding them with food" (11%); "don't throw rubbish into the sea" (7%), "love them", "finding solutions" and "don't pollute the sea" (1%); "help them to find a place to nest" (3%); "take good care of them" (2%); "keep the beaches clean" (2%); "released them" (2%); "ban people eating turtle eggs" (2%) and "don't eat turtle egg" (20%). The remaining 50% pupils didn't know how to help sea turtles.

Question 8: Do you like sea turtles? Why?

All children like sea turtles. They described sea turtles as “beautiful and cute” (51%); “good and tame” (24%); “unique” (5%). I had two surprising answers, there were 15% pupils responded “I like sea turtles because the egg is so delicious” and “I keep them as my pet” (5% pupils answered this).

3.5.3. Perhentian Island Primary School Report*Question 1: Do you know how many species of sea turtle nesting in Malaysia?*

Only 11% of pupils answered correctly. 42% of pupils didn't know the answer and 47% of pupils gave a wrong answer.

Question 2: What does “extinction” mean?

24% of the pupils described extinction “as being dead”, “no longer in exist” or “species of animals disappear from the planet”. 2% of them answered “population reduction” and 74% of pupils don't know what it means.

Question 3: Do you ever eat sea turtle eggs? If yes, why? If not, why not?

Almost the whole school children (98%) had experienced eating turtle eggs, only 4 pupils (2%) had never try before where the answered they gave were “my father didn't bring it to home and I don't want to try”. On average, their father/parents collected the eggs from the beaches or bought them from wet market. Those children said, “the turtle eggs were delicious”. 91% of the pupils would like to eat turtle eggs again and 5% said, “turtle eggs were their favourite food”.

Question 4: Did you throw plastic bags or rubbish into the sea? If yes, Why do you do that? If no, why not?

85% of the pupils answered “Yes” and the excuses they gave were “I followed what my parents did” (70%); “there is no dustbin” (11%); and “I just do whatever I like” (4%). 15 % of them answered “No” and the reasons given were “my father told me I can't do that” (9%); and “I throw it into dustbin” (16%).

Question 5: Have you seen a dead turtle before? If yes, what is your feeling?

77% of children had seen dead turtles before, it can be carcass of adult turtle or hatchling (juvenile turtles). 67% of them felt sad when they saw dead turtles while 10% of them were happy to see dead turtles and the remaining 23% hadn't seen dead turtle till today.

Question 6: Where in the world does the sea turtle travel?

With regards to the destination of the sea turtles travel, 65% of the children answer were at sea; 16%; at resort, 2% at another island; 4% of pupils answered finding food; 5% of them answered that they had found somewhere to lay eggs; 6% of pupils didn't know where it travel.

Question 7: What can you do to help sea turtles?

There were several of answers given by children such as “feeding them with food” (12%); “don't throw rubbish into the sea” (7%), “release them” (3%); “don't eat turtle egg” (10%);

and “set up turtle hatchery” (6%). The remaining 62% pupils didn't know how to help sea turtles.

Question 8: Do you like sea turtles? Why?

All children at the school like sea turtles except one pupil felt that sea turtles were disgusting. They had described that sea turtles were “beautiful and cute” (47%); “good and tame” (23%); “unique” (4%). I had two surprising answers in Perhentian Island school same as Redang Island school, they were 10% pupils responded “I like sea turtles because the egg is so delicious” and “I keep them as my pet” (15% pupils answered this).

3.5.4. Results of the children's drawings

Children were generally more likely to draw adult sea turtles and other marine life (50%). Nearly 33% of pupils were drew turtle laying eggs on the beach. About 5% of them were drew adult turtles and hatchlings. Some pupils (3%) were had a wrong concept about sea turtles such as female turtle laying eggs in the sea. Only 9% of the children did not draw and submit any picture at all. Most of the pupils from Perhentian Island only drew Leatherback turtle, one of the four species in Malaysia and this species doesn't land on that island. Why? The reason is what they see and learnt from school textbooks. Whilst pupils from Redang Island can draw different kind of sea turtles because they were more exposed to the sea turtle educational programme as i mentioned before “SEATRU”. 90% of the pupils knew what is sea turtle but less than 10% pupils drew out and expressed why we need to conserve sea turtles. Those children were from Redang Island and they were the groups have been participated the Sea Turtle Camp during nesting season.

Barraza (1999) points out children showed not only their ability to draw, but also put together their knowledge and their visual perception. These elements are vital for the development of the higher thinking processes and mental representations. Knowledge, age and the ability to draw affect drawings. Older pupils (Year 5 and Year 6) expressed more in their drawing, some of them drew how people poach turtle eggs; turtles entangled in the fishing net, throwing rubbish everywhere; It is confirm that children draw not only what they know, but what they see from everyday life. Some of them drew turtles and they wrote one line of sentence in the picture “Turtle is laying eggs. I like to eat turtle eggs.” This showed that how poor is the ecological knowledge among them, they learnt “don't eat turtle eggs” from books but they unable to act what they have learnt.

3.6. Results of interviews and observations with adults

In this section I will present to you the results of my interviews with some key persons in the islands: teachers, fishermen, egg collectors, educational officers and some students. Furthermore I will analyse this material in the following chapter (Ch. 3.7.).

Teachers

1: The teacher as agent-selling turtle eggs in the island offered me to try turtle egg but I refused his offer and he said:

“The turtle eggs also imported from neighbouring countries like Indonesia and Thailand. They received these turtle eggs by flight when the local eggs can't fulfil the local demand. Fresh turtle egg from the local is more expensive than the eggs that kept it in the refrigerator. The price of fresh turtle egg is between RM2-RM2.50 per egg (4-5krona). Eggs has been refrigerated is cheaper (RM1.50-RM2). Selling turtle eggs are profitable” he said.

2: “I have tried turtle eggs before, it was quite tasty and why do you think we need to stop eating eggs?” a female teacher on the island. The teacher showed that she has no knowledge about sea turtle as an endangered species and she asked me so many questions such as what are the threats to sea turtles.

3. “When I was first posting to this island to teach, pupils and villagers told me the yolk of the turtle egg is the most delicious part but it was not delicious as the local people described when I tried it” male English teacher 'A' said.

4. “Since sea turtles camp waved into the school's Year 5 curriculum activities and it has achieved the status of “attraction of the year” for that age group and teachers are encourage to attend the camp too. I think this is a good move for the school to accept SEATRU's invitation with an open heart. It is important that the children of this village are exposed to the happenings in their vicinity. I think Malaysia science education system is on the way to reform since it started taught science in Year One and I believe it is way to optimize the children cognitive development ” male English teacher 'A' said.

5. The English teacher 'B' who accompanied a class to the camp was convinced more than the pupils and set up a sea turtle corner in the school compound. “Turtles which nest on the island are the part of their heritage, and they (children) should be the first one to defend them” male English teacher 'B' said.

Fishermen

“Turtles always give us problems, they entangle in the fishing net and damage our net, we have to chop off their head sometimes” fishermen A.

“I don't think turtles will become extinct, we have collected them for so many generation; they still come ashore to lay eggs” said a fishermen work as an egg collectors.

Egg collectors

“In 90's, I can excavate an average of 15 turtle nests a day on island or even more sometimes. I sold these eggs to middlemen up to RM100 (SEK200) but it is double price now per nest; and I can generate money easily RM1500 (SEK3000-in 90's, today is SEK6000) just for one night nest hunting and it was a good return” the egg collector 'A' said.

Actually the egg collectors should sell the eggs to the State or NGO for conservation programme but they only sold half of the eggs and the other half-sold to the market. I asked why they do that.

“ I prefer to sell my eggs to vendors because the State and NGO offered me a lower price” egg collector 'B' said.

Government gave them license to collect those eggs and to handle them to the State for hatching instead of being consumed but those egg collectors do not perform their duty honestly.

Curriculum Development Centre Officer

“I think we have a good curriculum to teach the children about the environment including any environmental issues. Environmental education has been made an element to be integrated across the curriculum because it is apparent in all subjects taught in the school. The teaching and learning strategy for education across the curriculum emphasizes the following stages: (1) Awareness; (2) Knowledge; (3) Attitudes; (4) Skills; and (5) Involvement. I am sure if we follow the step, we can achieve our goal.”

Pupils

“I like to eat turtle eggs, it is so delicious” said a Year One pupil.

“Last week, my father was collected 500 turtle eggs form the beach and we finished all eggs. I love to eat turtle eggs especially the taste of the yolk”. said a Year 4 pupil.

“Turtle is cute and good animal” said a Year Two pupil.

“I saw sea turtles swimming in the sea when I took the boat to school” said year 5 pupil.

“I swore I don't want to eat turtle eggs again. It is so pity to see their population is going down to brink” said Year 5 pupil from Redang Island.

“I realized now why we need to protect and conserve sea turtles eggs after the camp” said a Year 5 pupil.

“I didn't eat turtle eggs this year, I promised to conserve them” said a Year 6 pupil (ex-participant sea turtles camp).

“It is so amazing to sea her laid egg, I can't forget what I have seen” said a Year 5 pupil.

Other observations

I have been to both islands many times since I started my conservation work few years ago. There was no improvement from my observation, which I compared with previous years.

1. In both islands, most of the parents don't know anything about environmental issues or awareness. In my opinion, the low level of education among the villagers becomes a problem to the surrounding environment. This is the reason why the kids followed what their parent did such as eating turtle eggs and throwing rubbish into the sea.
2. General lack of environmental consciousness by both resort/restaurants owners and tourists. I can see there are no proper drainage system, untreated sewage, sludge from kitchens and bath areas directly into a stream to sea.

3. I have also seen construction workers and villagers were burning woods, rubbish, broken furniture and cardboard everyday. Actually, it is clearly flouting a Department of Environment (DOE) prohibition against open burning. Although open burning is an offence under the Environment Quality (Clean Air) Regulations 1978 and carries a maximum fine of RM2000 (SEK4000) but no action was taken when I was there.

4. Analysis, Discussion and Conclusions

My results reveal that the ecological understanding among school children in Redang Island and Perhentian Island in the case of sea turtle as an endangered species is very low. As I explained in the background about sea turtles, their population decline of some few reasons such as eggs exploitation, killed elsewhere in south east region for their meat and carapace, become accidental victims of commercial fishing, excessive coastal development which destroys their nesting beaches, destruction of their food sources and pollution. In Terengganu, Malaysia included my case studies both islands, the biggest contributors to the significant decline of the turtle population here has been over-harvesting of turtle eggs in the past and now. As long there is local demand for turtle eggs, it will encourage illegal harvesting and collection turtle eggs. In this paper, I would like to use the "Norm Triad" to suggest "when the eating stops, the harvesting eggs stops". Islanders need changes to achieve this goal. So, there are three important pillar of the norm triad for both islands that are to be analysed and discussed here:

- (1) Do islanders have *will* to change?
- (2) Do islanders have *knowledge* to change?
- (3) Does the island have *possibilities/system conditions* to change?

4.1. Will to change

Pupils

Results of questionnaire, interviews and sea turtles camp in this paper provide interesting empirical data about the learning process and I found out the values and emotional wills become an important aspect need to be increased as part of education towards sustainability. I don't mean that we no need to increase the pupils knowledge; in my opinion current curricular is good enough to send the message out but pupils can't evaluate what they learnt because they lack of will to practice out the good values. They do know we need to protect sea turtles but children still eat turtle eggs and litter whatever they like. I belief that children are natural conservationist, just give a good explanation and effort and we can cultivate that instinct into a lifelong habit of respecting the environment. It is important to teach young children that we as human being need to care for our planet and we all can make a difference.

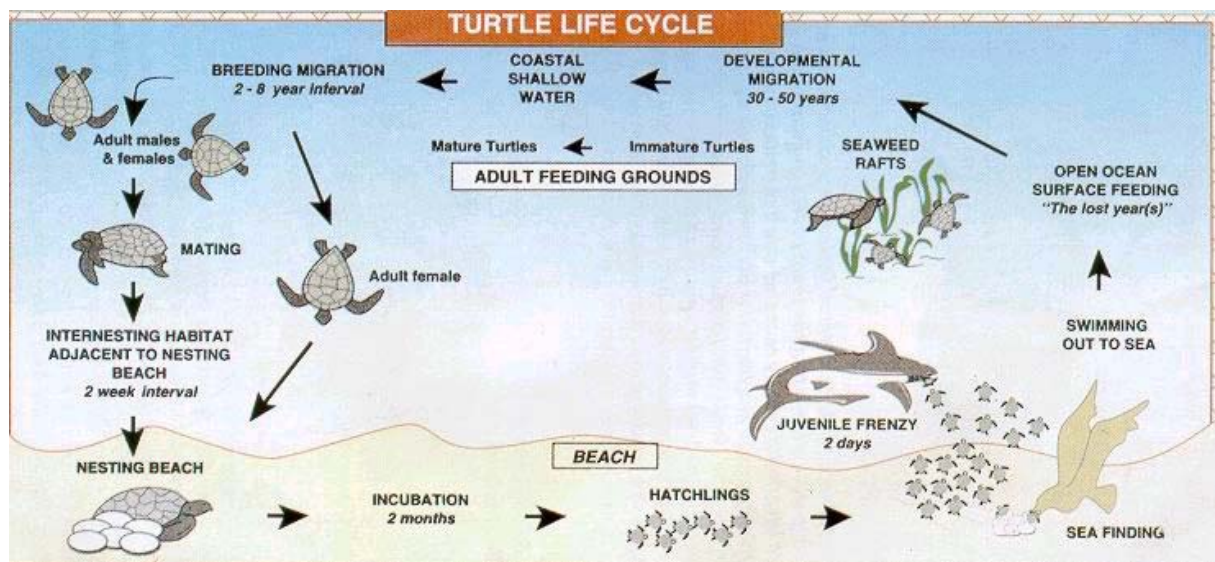
I agree with Eva Nyberg's research about learning life cycles at school can contributes towards an ecological understanding, understanding of environmental issues and sustainable development. According to Nyberg (2004), to study life cycles of different organisms in a planned and structured way is therefore a good start when learning about sustainability. She described

"getting an insight into the well adjusted mechanisms behind for instance fertilization and reproduction, the very condition for the continuity of life, would later on facilitate the understanding of how sensitive organisms can be to different kinds of disturbances. Then it

would not be difficult to understand that an organisms can be more sensitive during certain stages of growth, like the fact that young fish are more susceptible for acidification than grown up fish or that seals, living in a polluted sea, get their foetus damaged since the seal is at high tropic level in food chain.”

A good example I can give here is 'Sea turtles camp' organized by SEATRU (refer background) had changed the children views to sea turtles. They were taught about the biology (see Figure 4), ecology, problem faced by sea turtles and conservation. Good explanation, hand-on and mind-on activities to explore and involve themselves directly convinced them to change their previous views, attitudes and eat turtle eggs habits and practices which can harm sea turtles and environment. In other word, their will emotions increased lead them ready to change and their knowledge care about environment increasing too. Therefore, they stop to eat turtle eggs after joined the camp because they know and regret what they had done before. From the results, only Year 5 and Year 6 Redang Island pupils are changing their minds but not the whole school pupils and Perhentian Island pupils too.

Figure 4: Turtle Life Cycle



Source: Department of Fisheries Malaysia, 1999

Actually, it is easier to convince younger generation to accept good values and new concept they never learn before. So, this kind of education programme should target all pupil in school and children on the island because changing young minds is a good start to teach them care about our environment.

Villagers

They do have turtles conservation programme and seminars but islanders adults and old peoples are not easy to be convinced to change their minds. The fact is they still remain old aged practices, different traditional opinions and values. Only few of them understand the

plight of sea turtles, the meaning of endangered and extinction. After know more about this species, those families came out work for the turtle conservation (hatchery and protected beaches) on the island. From my investigation, 4 families on Redang Island and only 1 family on Perhentian Island try to protect as much turtle eggs as they can from being illegal egg collection. They do their best to convince their friends too.

4.2. Knowledge to change

Pupils

In my opinion, Malaysia has a good planning and implementation of current science curricular but it need to take account the importance of science products as evaluation. For this case, the pupils from both islands showed that has a very low interest in science subject. It needs to evaluate why good curricular failed in this islands. Why science is so important? According to Poh (2003), a Malaysian who wrote the syllabus of the methodology components for the science major programme of the Malaysian Teaching Diploma awarded by The Teacher Education Division, Ministry of Education identified children will discover and then build important ideas when using science process skills; they will acquire knowledge by collecting and processing information. They will build concepts of the natural environment, the use of natural resources by man and the effect of the use of these resources on society. Children will also find that scientific knowledge can influence natural surroundings and therefore they must be responsible and careful in using the knowledge acquired. He states it is important that children understand that science is tentative, that it changes according to time, and will still change.

To increase their interest in science subject, the first thing to change is their attitudes to science. An attitude is a way of thinking and behaving (Hornby, 1997). Poh (2003) argues that there are three important factors in science attitudes. Firstly, the attitude of a child determined whether his or her mental state is ready for him or her to learn science. With a positive attitude, a child can see an object, a topic, an activity and other persons positively. If he is not yet ready, he will refuse to interact with his science related surroundings. Readiness is a factor which a child may not be aware or has thought of, but will determine whether or not he will succeed in learning science.

Secondly, attitudes exist naturally. Attitudes can be learnt and organised by experiences throughout the child's growth and development. As a result, a child attitude can be changed by the accumulation of experiences.

Thirdly, attitude is the outcome of a dynamic experience and acts as a directing factor when the child acquires new experiences. Therefore, attitude covers the emotional as well as the intellectual aspect as I discussed to increase the will among the children in my front discussion. Both aspects influence the child in making decisions and judgment, which in turn enables the child to priorities and make alternative choices. Here, I would like to present the science attitudes classified in the "Pedagogy of Science" (Poh, 2003) which based on

Malaysian society and I wish the Education Division would see this point to enhance the implication of teaching in schools. In “Pedagogy of Science”, there are divided to two types of science attitudes: emotional attitude and intellectual attitude. Emotional attitude causes a person to act according to strong emotional feeling whereas intellectual attitude causes a person to be more concerning and to use his intellect.

Table 3: Classification of positive attitudes and values which are inculcated in learning science in Malaysian schools.

<p>Emotional Attitude Children are inquisitive when it comes to learning and acquiring new experience. Keeping in mind this natural tendency of children, we can encourage them to further develop the following attitudes:</p> <ul style="list-style-type: none"> • interested and inquisitive about natural surroundings • flexible and open-minded • persevering in carrying out new ventures • co-operative • compassionate • thankful to God for His gifts/blessings • appreciate and practise clean and healthy living 	<p>Intellectual Attitude Taking off from children's positive learning experiences, we can encourage them to further develop the following attitudes:</p> <ul style="list-style-type: none"> • honest and truthful in recording and confirming data • systematic and confident • responsible for the safety of self, friends and the environment • appreciative of the contribution of science and technology • be aware that science is one of the ways to understand nature
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Source: Pedagogy of Science 1, 2003

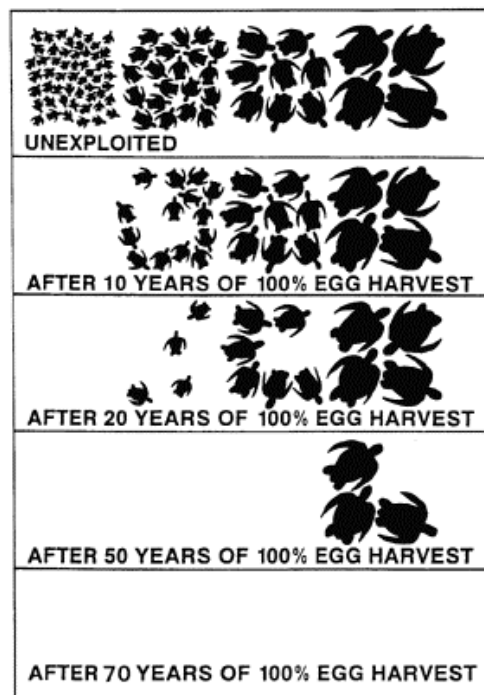
From the Table 3 and my observations, I think children on the island are more emotional than intellectual from the case of sea turtles camp educational programme. So, I believe that inquisitiveness is the natural starting point in encouraging and teach children to learn science. Other emotional attitudes important too, these are useful, basic attitudes to build scientific attitudes and knowledge and these are ensure that the child continues learning and succeed in learning science towards education as part of sustainability.

Attitudes that are based on intellect and rational thinking develop parallel to the acquisition of science process skills, and the discovery and construction of meaningful ideas (Poh, 2003). Poh (2003) identify intellectual skills include the willingness to follow procedures so as to ensure the objectivity of the study; being sceptical about other people's opinion; and accepting only views supported by evidence.

Villagers/fisherman/egg collectors

From the analysis, I discovered that those groups do not understand why we need to protect turtle eggs. I think the most important information need to explain to them is the life cycle of sea turtles. They should be informed clearly about that turtles have to lay a lot of eggs to increase their chances of survival because there are many natural predators. It needs to give them a figure (fact)- as many as 1000 to 10,000 eggs may be needed to produce one adult male or one adult female due to their high rate of mortality. It needs to explain only few turtles survive long enough to make it to adulthood. Their only strategy for survival as a species depends on many being hatched in the hope that a few will live long enough to continue their cycle of life. So when humans poach turtle eggs, we are simply reducing their chances of survival as a species. Here, I would like to suggest using Mortimer's over-harvest of eggs to teach the islanders to increase their knowledge about conservation to sea turtles. These diagram have proven effective in public awareness campaign which Mortimer has conducted and she encourage anyone who wishes use them to do conservation on elsewhere.

Figure 5: Over-egg harvesting



Source: Mortimer, 1995

This Figure 5 represents the destruction of a green turtle nesting population through over-harvest of eggs -- as is occurring in many parts of south-east Asia and elsewhere. For this model, females are assumed to take 20 to 50 years to reach adulthood (National Research Council, 1990) and then to remain reproductively active for about 20 years (Carr et al., 1978). The diagram illustrates how harvesting 100% of the eggs would destroy the population "from

the bottom up" because no new hatchlings would enter the population. According to Mortimer (1995) (see Figure 5):

- a) After 10 years of 100% egg harvest, no hatchling turtles will remain in the population, and the number of juvenile turtles will be reduced. However, the numbers of subadults and breeding adults will be the same as in the unexploited population. [Hatchlings will be eliminated from the population after only one year of 100% egg harvest.]
- b) After 20 years of 100% egg harvest, there will be no hatchlings, and fewer juveniles and subadults than were in the population after 10 years of 100% harvest. However, the numbers of breeding adults will remain the same as in the unexploited population.
- c) After 50 years of 100% egg harvest, there will be no hatchlings, no juveniles and no subadults remaining in the population. The numbers of breeding adults that come to the nesting beach will have begun to decline. Only at this point will it be apparent to the general public that the population is in decline. By now, however, the population is on the verge of extinction. All the females remaining in the population are at least 50 years old.
- d) After 70 years of 100% egg harvest, the turtle population will be extinct by the 71st year.

4.3. Possibilities

Teachers

From the interviews and observation, teachers on the island lack knowledge about sea turtles and other environmental issues. Furthermore, I can say the teachers have not mastered the skill of teaching. I can see science teachers in primary school merely feeding students with scientific facts that they can recall during examinations. Pupils are not encouraged to "brain storm" in class which require critical thinking although thinking skills is least in the pedagogy methodology.

Firstly, I think teachers should change their ethic as profession. They need to master the skill of teaching and a teacher needs to study in detail the subject syllabus and curriculum specifications first. The reason is curriculum specifications commonly explain the emphasis and list the topics that are required to be taught in a year. He or she should prepared daily lesson planning before go into the class. I mentioned this because I saw teachers not prepared well and he himself lack of understanding of science, many teachers may be teaching science in a way which is disconnected to how it applies in daily life. It is so important to prepare before the teaching process begins.

As Mok (2003) states the teacher concerned ought to collect all the required information so that he can plan out effective and meaningful teaching and learning activities which based on pupils' ability and needs. As an educationist, a teacher should be responsible to the task accorded. I would like to emphasis as a profession, teachers have the accountability to keep up the good name of teaching profession. Mok (2003) also states, with keep this in mind,

teachers are responsible to improve the image of teaching profession by providing high quality services such as teaching students efficiently and with full of dedication. In this respect, teachers must always aim to improve their knowledge and skills in teaching and learning. Teachers play an important role as agent of change in school and society they are the one make preparation for school children to adapt and accommodate new changes of the present and future.

Alternative income

The Terengganu government set up the “Koperasi Setiajaya” Pulau Redang in 1989 to develop and manage socio-economic programmes that could improve the livelihood of Pulau Redang islanders. Besides egg collection, the cooperative is empowered to manage the island's garbage disposal contract and bird's nest collection (Chiew, 2000a). I hope the state government will do the same project in Perhentian Island too. I can see the encouragement and loans from co-operative make the people change their job to tourism sector where it more profitable than collection turtle eggs.

According to Chiew (2004), SEATRU also suggests an eco-tourism project for Mak Simpan, one of the turtle nesting area on Redang Island, where turtle watching activities can be introduced for tourists. However, Professor Chan said such activity must be regulated to ensure that turtles can continue to nest undisturbed and SEATRU will work with the villagers to ensure that their loss of income can be replaced by non-consumptive economic activities. Concerning villagers who have to give up their traditional egg collecting rights might react negatively; Chan believes that SEATRU's community-based approach to conservation will win villagers over.

Law

Effort to manage and conserve sea turtles in Malaysia stated since 1950's but it doesn't work well. The scope of conservation efforts should be broadened to encompass all aspects relating to turtle ecology. According to Sharma & Salam (1999), an active sea turtles conservationist in Malaysia, there are four important aspects that need to be addressed in an integrated approach basically, namely legislation and enforcement; environmental education; nesting, inter-nesting and feeding habitats; in-situ and ex-situ egg incubation programmes. Suggestions regarding protection and conservation of sea turtles as below:

(a) Commercial exploitation of marine turtle eggs.

Sharma & Salam (1999) identified that it has been estimated that the rates of survival from egg to adult range from an average of one adult out of 1,000 to 10,000 eggs given a population with a 70% to 85% hatch rate. In order to maintain a healthy nesting population over the long term, at least 70% of the eggs need to be protected. At present only about 30% of the collected eggs are sent to hatchery. So, in an effort to increase the production of sea turtles hatchlings:

- all species turtle eggs collected by licensed egg collectors need to be utilised for hatchling production either through in-situ or ex-situ incubation.

- There is a need to impose national ban to all species of sea turtle eggs in Malaysia for consumption and commercial sale.
- There is a need to improve enforcement to ensure that laws and regulations are followed and also to prevent illegal egg collecting activities by poachers.

(b) Sea turtles related legislation in Malaysia

- There is a need to integrate and interlink all relevant legislation regarding conservation and protection of sea turtles in order to produce a legislation that covers all aspects of conservation, protection, and management of sea turtles, their eggs, their nesting as well as their related habitats and ecosystems (Sharma & Salam, 1999).

(c) Establishment of more hatcheries and sanctuaries

- More hatcheries and sanctuaries should be set up to protect sea turtles, their nesting beaches, their feeding ground.

Smart School in Malaysia

The Smart School is an educational institution with emphasis on thinking-enable learning, student-centered, using technology and multimedia wisely, applying teaching-learning strategies appropriately and effective school management in order to create a meaningful as well as effective schooling and learning environment.

Source: What is Smart School? (Mohd Dahalan Mohd Ramli, 2000)

In 1997, the Ministry of Education planned to set up Smart Schools in Malaysia. The Smart School project is one of the seven Multimedia Super Corridor (MSC) flagship applications. In this project, three aspects were emphasised. First, the process which involves teaching-learning, information technology (IT) infrastructure, management system, assessment system and system integration; second, school infrastructure development; third, training of teachers and management staff (Poh, 2003).

Under this plan, 90 schools in 1999 were the pioneers of the Smart School Project. This will be extended to all schools in Malaysia by 2010.

According to Poh (2003), Smart Schools encourage students to be independent in accessing knowledge. Students are provided with a opportunity to learn at their own pace as well as to explore independently new fields which interest them. Thus, the students are able to maximise their potential to achieve excellence. Smart Schools use technology as tools to enhance learning in the field of science and technology as well as to prepare students to face the challenges presented in this era of information and communication technology (ICT). The Ministry of Education appointed the Telekom Smart School consortium to design, develop and prepare a smart school solution package. The Smart School solution package includes

ICT-enabled learning course-ware for Malay Language, English, Science and Mathematics. Here, I would like to present the Smart School science curriculum.

KBSR Smart School Science Curriculum (Kurikulum Sains KBSR Sekolah Bestari)

In the Smart School curriculum, the following aspects are give emphasis:

- Knowledge acquisition, for example, knowledge on life process in science Year 4.
- Mastering of general across curriculum thinking skills, for example, making conclusions based on facts provided.
- Mastering of specific subject-specific thinking skills, such as scientific skills for science.
- Inculcation of noble values, such as loving the environment.
- Knowledge and skill in using computers which are integrated into all subjects.

(Source: Poh, 2003)

I hope this Smart School programme will enhance the pupils thinking skills in school curriculum because thinking is a mental process for interaction between knowledge, skills and attitudes to enable an individual to understand and make use of this environment. I wish it could use ICT to teach environmental education at school in the future will be realized.

Summary of discussion

Young people in these islands should generally be more informed about environmental issues than their parents were. The young people will realise that the unsustainable livelihoods of their parents were deteriorating their opportunity making a living on the island in future. When they noticed that unpredictable impact, they would change their will to harm environment; the knowledge care about environment would increase more at the same time. Therefore, will to change and increasing knowledge of environmental issues about their causes and consequences has reached to the children and it enables them to grow up as a more responsible adult to care about environment. As I mentioned in earlier discussion, to achieve this goal the practical experiences such as hands-on and minds-on activities which children can gain at school or conservation educational programme is important.

School, headmasters and teachers play an important role in system condition. Children spend most of their time in school and school is a place determined whether the attitudes of children towards environment had been formed by environmental education. This is the reason why Barraza (1999) suggested that children who are constantly involved in environmental projects at school gather more information on environmental issues and depending on the content of the classes, it may develop an 'environmental biased' perception of the world. Finally, I hope that environmental educators will provide more realistic information on the local ecology and environment problems including global issues should not be neglected by villagers in this case.

As a summary for discussion, the three pillars of the norm triad can effect each other's – if three of them increase, the norm can change too. So, it shows that we are not only putting efforts to one aspect, we need to solve out where, what and why the problems appeared and all should be take into account to find a good solution to improve the action patterns.

4.4. Conclusions

As mentioned before, my results reveal that the ecological understanding among school children in Redang Island and Perhentian Island in the case of sea turtle as an endangered species is very low. A change in emotions and attitude can cause a child who doesn't like science to take on a neutral attitude towards science, and later, a positive attitude towards science when given encouragement. He or she becomes more open to science and can entertain different perceptions of the subject, and acquire more ideas and useful skills to learn science; all this is the learning outcome experience. The same is true for villagers and fishermen, only after understanding the relationships between the attitudes that people have toward the environment and the factors that influence these attitudes we will be able to comprehend and improve the public's attitudes toward nature. They can help the islands achieve a sustainable economy if they will be willing to change their old aged attitudes, which accept only views supported by scientific evidence about the decline of turtle population, and to give up eating turtle eggs.

About the curricula, each curriculum was formulated based on the contemporary philosophy. The syllabus of the curriculum was well published, just followed by the appropriate training for teachers to teach the curriculum. Actually, the implementation of the curriculum lies in the hands of teachers. In order to make the objectives of the curriculum a success, teachers have to internalise the needs and objectives of the curriculum. They have to try their best to implement the teaching learning strategies as proposed by the curriculum developers so that the learning objectives from the aspect of knowledge, skills, attitudes and values will be achieved (Poh, 2003). I believe that an educational establishment completely determines the attitudes, behaviours, and acquisition of knowledge of the pupils attending it.

Lastly, Malaysian government need to establish more nesting sites as sanctuaries; improve current environmental protection laws and sea turtles legislation; provide alternative income sources for people who harvest turtle eggs for sale.

As a final conclusion, changes start with the change in knowledge, will/values, emotions, attitudes and/or possibilities – and all these aspects influence human's actions. So, “When the eating stops, the harvesting eggs stops” – and this dream can be fulfilled in the future.

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Appendix

Perhentian Island Primary School

Total Pupils: 161

1. Do you know how many species of sea turtle nesting in Malaysia?

	Pre-school	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
I don't know	2	8	10	14	20	3	10
One	2	1	1	1			
Two	3	8	3	4		15	2
Three	4	2	1	4		1	1
Four		1	1	2		4	10
Five	3	4	4			1	3
Six	2	1					2
Seven		1					
Ten					2		
Total	16	26	20	25	22	24	28

2. What does "extinction" mean?

	Pre-school	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
I don't know	16	26	20	25	20	5	7
Life being dead					2	6	5
No longer exist/ species of animal disappear from the planet						13	13
Population reduction							3
Total	16	26	20	25	22	24	28

3. Do you eat sea turtles eggs? If yes, why? If no, why not?

	Pre-school	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Yes, my father collected from the beach. It is do delicious, I want to eat again.	5	7	11	13	6	7	11
Yes, my parents bought the eggs from wet market. It is do delicious, I want to eat again.	11	9	8	11	15	10	12
Yes, turtle egg is my favourite food.			1		1	2	4
Yes but I don't like the taste.						2	1
No, my father didn't bring it back to home.				1			
No, I don't want to try						3	
Total	16	26	20	25	22	24	28

4. Did you throw plastic bags or rubbish into the sea? If yes, why do you do that? If no, Why not?

	Pre-school	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Yes, there is no dustbin.		3	2	3	1	1	8
Yes, I followed what my parent did.	12	18	14	17	21	12	18
Yes, I just do whatever I like.			1			4	2
No, my father told me we couldn't do that.	3	3	3	5			
No, I throw it into dustbin.	1	2				7	
Total	16	26	20	25	22	24	28

5. Have you seen a dead turtle before? If yes, what is your feeling?

	Pre-school	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Yes, I feel sad to see dead adult turtle at the beach / open sea.	6	13	6	10	19	10	18
Yes, I feel sad to see juvenile turtle at the beach.	4	2	5	3	1	5	6
Yes, I feel happy to see dead adult turtle at the beach / open sea.	5	8					
Yes, I feel happy to see juvenile turtle at the beach.		3					
No, I haven't seen it.	1		9	12	2	9	4
Total	16	26	20	25	22	24	28

6. Where in the world does the sea turtle travel?

	Pre-school	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Sea	15	16	15	15	8	22	13

Resort		7		7	12		
Another island		1	2		1	2	
Finding food							6
Find somewhere to lay their eggs.							8
I don't know.	1	2	3	3	1		1
<i>Total</i>	<i>16</i>	<i>26</i>	<i>20</i>	<i>25</i>	<i>22</i>	<i>24</i>	<i>28</i>

7. What can you do to help sea turtles?

	Pre-school	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Feeding them with food.		2	12	20	9	11	14
Don't throw rubbish into the sea.		20		4		8	4
Don't eat turtle eggs.			5	1	13		
Set up hatchery.		4	3			3	4
Release them.						1	6
I don't know.	16						
<i>Total</i>	<i>16</i>	<i>26</i>	<i>20</i>	<i>25</i>	<i>22</i>	<i>24</i>	<i>28</i>

8. Do you like sea turtles? why?

	Pre-school	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Yes, they are beautiful and cute.	8	2	12	20	9	11	14
Yes, they are good and tame.		20		4		9	4
Yes, I keep them as pet.	5		5	1	13		
Yes the egg is so delicious.	2	4	3			3	4
Yes, they are unique.						1	6
No, they are disgusting.	1						
<i>Total</i>	<i>16</i>	<i>26</i>	<i>20</i>	<i>25</i>	<i>22</i>	<i>24</i>	<i>28</i>

Redang Island Primary School

Total Pupils: 221

1. Do you know how many species of sea turtle nesting in Malaysia?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
I don't know.	31	20	10	3	5	
One	1	2				
Two	6	1	1	4	3	
Three	1	4	4	1		
Four		1	2	17	27	30
Five			8	4		4
Six		2	13	9		
Seven			1	1		
Eight				2		
Ten	1		1	1		
<i>Total</i>	<i>40</i>	<i>30</i>	<i>40</i>	<i>42</i>	<i>35</i>	<i>34</i>

2. What does "extinction" mean?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
I don't know.	40	30	35	36	5	
Life being dead			5	4	12	9
No longer exist/ species of animal disappear from the planet					16	14
Population reduction				2	2	11
<i>Total</i>	<i>40</i>	<i>30</i>	<i>40</i>	<i>42</i>	<i>35</i>	<i>34</i>

3. Do you eat sea turtles eggs? If yes, why? If no, why not?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Yes, my father collected from the beach. It is do delicious, I want to eat again.	27	15	24	23	2	3
Yes, my parents bought the eggs from wet market. It is do delicious, I want to eat again.	11	11	13	17	1	2
Yes, my father collected from the beach. It is do delicious but I don't want to eat again.		3	1	2	24	21
Yes, turtle egg is my favourite food.			1		6	3
Yes but I don't like the taste.					2	3
No, my father didn't bring it back to home.	2		1			
No, I don't want to try		1				2
<i>Total</i>	<i>40</i>	<i>30</i>	<i>40</i>	<i>42</i>	<i>35</i>	<i>34</i>

4. Did you throw plastic bags or rubbish into the sea? If yes, why do you do that? If no, Why not?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Yes, there is no dustbin.	10	1	10		9	8
Yes, I followed what my parent did.	24	17	21	33	22	21
Yes, fishes would eat the rubbish.		1				
Yes, I am lazy to throw into dustbin.			1		1	
Yes, I just do whatever I like.					1	2
No, my father told me we couldn't do that.	1	1				
No, I throw it into dustbin.	5	10	2	9	2	3
No, it polluted our sea.			3			
No, if the sea contaminated fishes and turtles would died.			3			
<i>Total</i>	40	30	40	42	35	34

5. Have you seen a dead turtle before? If yes, what is your feeling?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Yes, I feel sad to see dead adult turtle at the beach / open sea.	9	5	14	13	17	21
Yes, I feel sad to see juvenile turtle at the beach.	2		10	15	13	9
Yes, I feel happy to see dead adult turtle at the beach / open sea.	7	2				
Yes, I feel happy to see juvenile turtle at the beach.	4	2				
No, I haven't seen it.	18	21	16	14	5	4
<i>Total</i>	40	30	40	42	35	34

6. Where in the world does the sea turtle travel?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Sea	28	20	27	40	24	26
Beaches	6	1	2	1	3	2
Marine Park	4					
Jetty			1			
Find somewhere to lay their eggs.					8	5
I don't know.	2	9	10	1		1
<i>Total</i>	40	30	40	42	35	34

7. What can you do to help sea turtles?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Feeding them with food.	2	2		20		
Love them.	1					
Don't throw rubbish into the sea.			4	3	3	6
Don't pollute the sea.			1			
Help them to find a place to nest.				6	1	
Find a solution to help them.				2		
Take good care of them.						4
Don't eat turtle eggs.					25	19
Keep the beaches clean.					3	1
Ban people eating turtle eggs.					1	3
Release them.				1	2	1
I don't know.	37	28	35	10		
<i>Total</i>	40	30	40	42	35	34

8. Do you like sea turtles? why?

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Yes, they are beautiful and cute.	21	12	19	19	18	23
Yes, they are good and tame.	3	9	10	17	11	4
Yes, I keep them as pet.	6		2	3		
Yes the egg is so delicious.	10	9	9	3	1	
Yes, they are unique.					5	7
<i>Total</i>	40	30	40	42	35	34