MARINE TURTLE RESEARCH, MANAGEMENT AND CONSERVATION IN INDONESIA

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INTRODUCTION

Indonesia, with its 17,508 islands, 70 km2 of coral reefs, sea grass beds and 81,000 km length of beaches (included sandy beaches), offers excellent habitat of marine turtles. Of these potentials habitat, six of the world's seven species of marine turtle occur in Indonesia. On these six species, four - the Hawksbill, Penyu Sisik (*Eretmochelys imbricata*); the Olive Ridley, Penyu Lekang (*Lepidochelys olivaceae*); The Leatherback, Penyu Belimbing (*Dermochelys coriacea*); the Green, Penyu Hijau (*Chelonia mydas*) turtles are known and another - the Loggerhead, Penyu Tempayan (*Caretta caretta*) is believed to nest in varying numbers on beaches throughout the archipelago (Salm 1984; Salm and Halim 1984; Kitchener 1996). The sixth species - the Flatback, Penyu Pipih (*Natator depresus*) nests exclusively in Australia but has been observed feeding in Indonesian waters (Kitchener 1996). The only one species of the world's seven species of marine turtle (*Lepidochelys kempi*) does not occur in Indonesia, they live only in Atlantic ocean particularly on coastal zone of America and Mexico (Nuitja,1996).

Concern about the continuing decline of marine turtle population and the potential impact of the growing commercial fisheries has prompted the Indonesian government to develop an action plan for conserving marine turtle. In addition, several efforts on marine turtle conservation particularly on green and hawksbill have been under taken by the government with the help from international agencies such as World Wildlife Fund for Nature (WWF), the Food Agriculture Organization (FAO) and the Japan Bekko Association (JBA).

Man primarily causes the over exploitation of marine turtle resource. In some areas, they hunted for meet while in areas eggs are being harvested. These creatures are widely used for food and ornaments by fisherman and people living along the coastal coast areas. In spite of, the abundance in species diversity of marine turtle, little research has been conducted on their biology and management in Indonesia. One trend, however is obvious population of marine turtles in Indonesia have decreased dramatically in the last 50 years. An indication of the decline in marine turtle population in Indonesia is the difficulty Balinese and Bugis turtle hunters experience in their pursuit of large turtle, which bring in the highest price. The former hunting grounds around Bali have been depleted through over exploitation and turtle hunters now travel to the remotest parts of the Indonesian archipelago in pursuit of large turtles, which have become scarcer (IUCN 1984; Schulz 1984; Green peace 1989; Ketut Sarjana Putra 1996; Wamafma 1996).

This report present a summary of current progress of marine turtle research, management and conservation in Indonesia.

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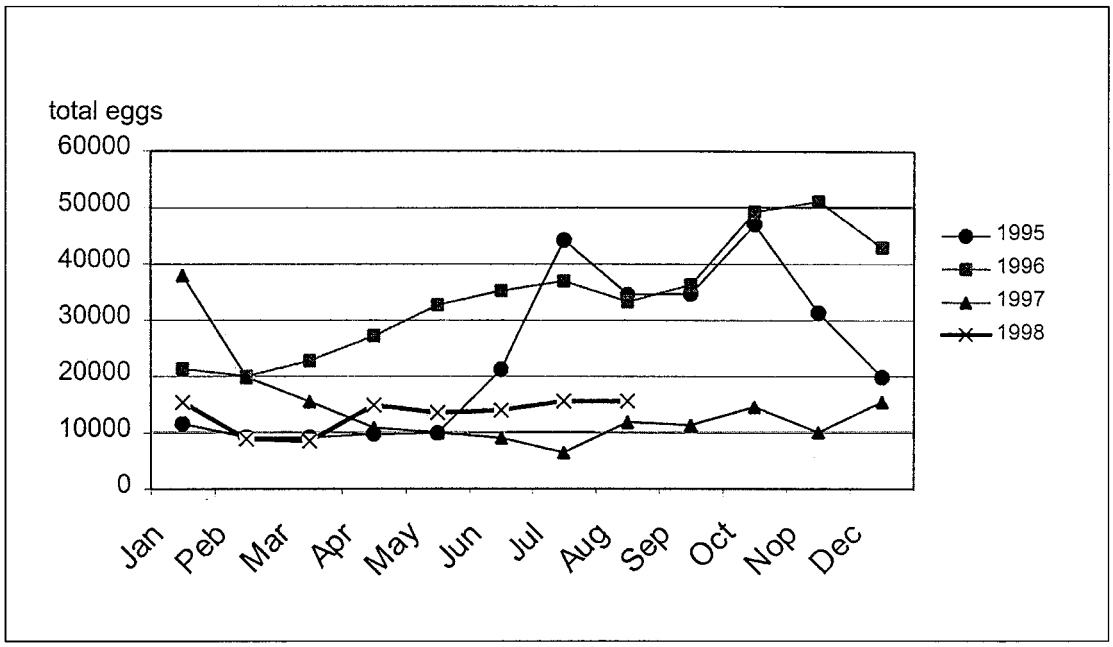
POPULATION AND DISTRIBUTION

The status of those six species marine turtles in Indonesia as follows;

1. Green Turtle (*Chelonia mydas*)

The local names of green turtle are Penyu Hijau, Penyu Daging and Penyu Laut. In Indonesia this green turtle have been utilized traditionally by people since few centuries ago, particularly Balinese. The green turtle is the only species among 6 species occurring in Indonesia has just been protected recently, since the Indonesia Government Legislation no. 7/1999 was declared this year, putting all of 6 species marine turtles occurring in Indonesia on a list as protected animals. The green turtle is the most commonly encountered species of marine turtle in Indonesia. It can be found nesting throughout the archipelago in varying numbers from the large rookeries on the islands in Berau-East Kalimantan, to isolated nesters on small beaches in every region of Indonesia (Wicaksono 1992). Pangumbahan is one of the major green turtle nesting beaches in Indonesia and the only remaining nesting beach of any importance on Java. However, many of the larger rookeries have decreased in the last 50 years, due to over-harvest (Schulz 1984; Salm 1984; Kitchener 1996).

Figure 1: Monthly fluctuation of green turtle eggs production at Pangumbahan beach, West Java



Source: PT. Daya Bakti, Cicuruk-West Java.

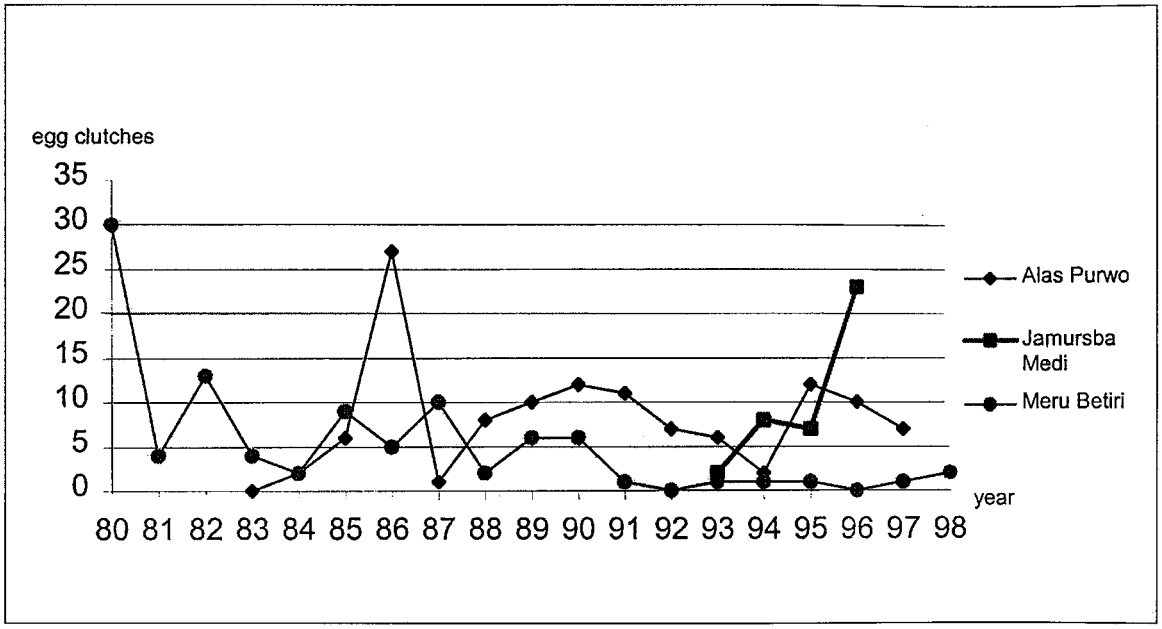
Egg harvest of all marine turtles species are done by local fishermen, almost every egg laid by all marine turtle species is collected for human consumption in Indonesia. Although once a subsistence take, the eggs are now sold to distant markets within the country and many are illegally exported to Sarawak, Malaysia. A good example of the devastating impact of this egg collection can be found on Pangumbahan beach. Nesting season of the green turtle in this beach is happened in all the year, but the peak season occurs from June to October (See figure 1).

2. Hawksbill (*Eretmochelys imbricata*)

The local names of this turtle are Penyu Sisik, Fonu Koloa, Penyu Genteng, Penyu Kembang, Penyu Katungkera and Wau (Adisukresno 1993). It has been protected based on Ministerial of Forestry decree no. 882/Kpts-II/1992. Hawksbill turtle populations have also been declined, but at present hawksbill can still be found throughout Indonesia in significant numbers (Salm 1984;

Salm & Halim 1984, Schulz 1984, 1987, 1989, Halim 1998). Important nesting areas are the many islands in the Anambas and Natuna-Riau; Lima, Momperang, Pesemut-Belitung; Segamat Isl.-Lampung, South of Ujungpandang; Bira-birahan, Derawan-East Kalimantan (Salm & Halim 1984; Shulz 1984; Soehartono 1993, Halim 1998). The hawksbill turtle is a exceedingly difficult to monitor for long term trends, for a number of reasons. First of all small numbers of animal 's nest on wide variety of beaches across a broad geographic area. Secondly, hawksbill beaches tend to be remote, inaccessible and sometimes so narrow that the turtle leaves no crawl trace. Finally, hawksbill also exhibits the large year-to-year fluctuations in nesting counts characteristic of green turtles. For instance, in Kepulauan Seribu Marine National Park (108,000 Ha), off the Jakarta Bay, hawksbill turtle nest widespread of few small rookeries among 110 coral cays. This figure 2 shows the hawksbill nested in small quantity in 3 different locations such as, Alas Purwo National Park-East Java; Jamursba-Medi beach-Irian Jaya; and Sukamade beach, Meru Betiri-East Java.

Figure 2: Annual trend of egg clutches of hawksbill in 3 different places in Indonesia



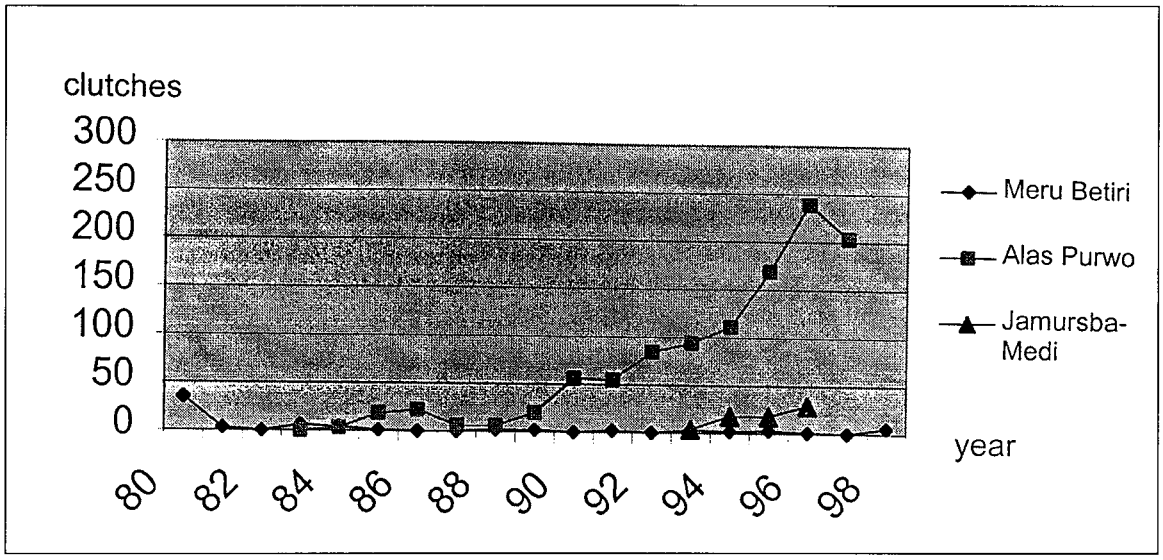
Source: Alas Purwo NP; Meru Betiri NP & KSDA-Sorong Irian Jaya.

In some rookeries the nesting season of this species is varied, for instance Kepulauan Seribu NP (December-April), Segamat Isl.-Lampung (December-April), Belitung (January-June), Paloh-West Kalimantan (February-May) and Tambelan, Riau (February-May).

3. Olive ridley (*Lepidochelys olivaceae*)

The local names of olive riddle are Penyu Lekang, Slengkrah, Penyu Abu-abu and Penyu Ridel, it has been protected since 1980 based on the Ministerial of Agriculture decree no. 716/Kpts/ Um/10/1980. Olive ridley turtles are found in small numbers throughout Indonesia, with the main nesting area in Sumatera, Alas Purwo-East Java, Paloh-West Kalimantan and Nusa Tenggara (Salm and Halim 1984; Shulz 1984; Kitchener 1996; Darmawan 1996). The annual trend of Olive ridley clutches in Meru Betiri NP, East Java, Alas Purwo NP, East Java and Jamursba-Medi beach, Irian Jaya in figure 3 & 4 shown that Ngagelan beach in Alas Purwo NP is the most nesting habitat of Olive Ridley. The trend of nest fluctuation of this species also looks increased, one of the reason, that this area must be well managed and controlled.

Figure 3: Annual trend of Olive ridley clutches in 3 different beaches



Source: Alas Purwo NP; Meru Betiri NP & KSDA-Sorong Irian Jaya.

4. Leatherback (*Dermochelys coriacea*)

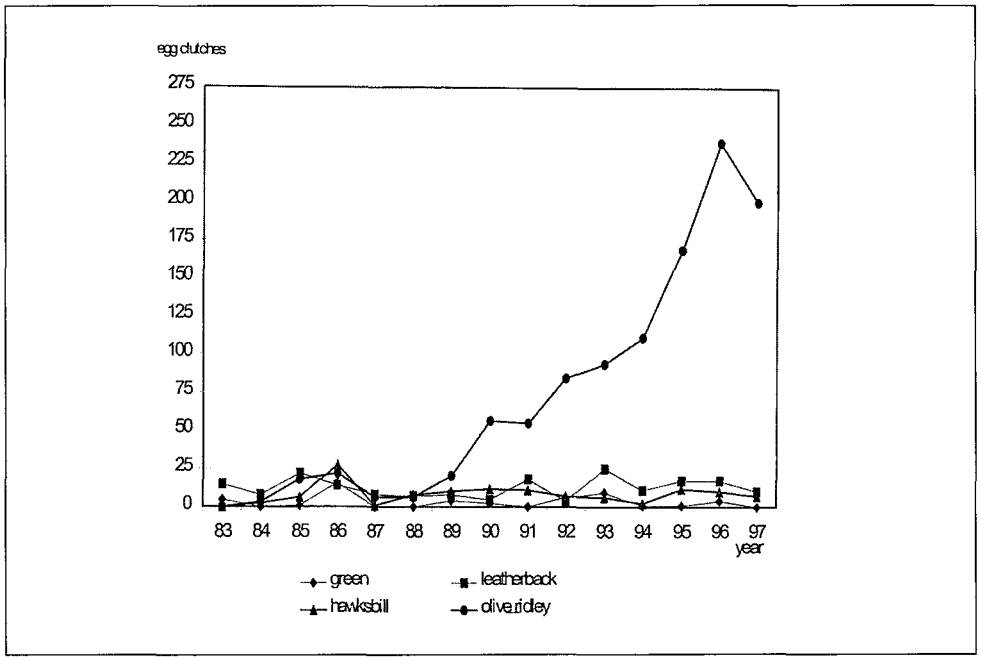
Adisukresno (1993) noted local names of this leatherback were Penyu Belimbing, Penyu Raksasa, Kantong, Kantong Gelingsing and Mabo. It has been protected since 1978 based on the Ministerial of Agriculture decree no. 327/Kpts/Um/5/1978. The leatherback turtle can be found nesting of the western coast of Sumatera, South Java and isolated areas in Nusa Tenggara (Salm and Halim 1984; Kitchener 1996). However, the largest rookery in Indonesia and one of the largest known leatherback rookeries in the world, can be found on the north coast of the Bird's Head Peninsula of Irian Jaya, on the beach of Jamursba-Medi (Bhaskar 1987). Nababan and Jacob (1996) described the leatherback population in Jamursba-Medi declined rapidly in the last 15 years, because of the utilization and habitat destruction. In 1984, the nest can be reached 200 up to 250 clutches per night during nesting season (May – September), on 18 km length of the beach, But in 1996, it is dropped until 25-30 clutches per night, total nest in this year was 5,058 clutches, much higher than the last 3 years (see table 1).

Table 1: Total clutches of marine turtles in Jamursba-Medi 1993-1996

No.	Turtle species	Total clutches			
		1993	1994	1995	1996
1.	Leatherback (*Dermochelys coriacea*)	3,247	3,298	3,382	5,058
2.	Green (*Chelonia mydas*)	4	11	20	11
3.	Hawksbill (*Eretmochelys imbricata*)	2	8	7	28
4.	Olive ridley (*Lepidochelys olivacea*)	4	18	18	29
5.	Flatback (*Natator depressus*)	0	0	1	0

Source: Nababan and Jacob (1996)

Figure 4: Number of egg clutches of marine turtles at Ngagelan beach, Alas Purwo National Park



Source: Alas Purwo NP.

5. Loggerhead (*Caretta caretta*)

The local people called this loggerhead as Penyu Tempayan, Penyu Karet and Penyu Bromo. It has been protected since 1980 based on the Ministerial of Agriculture decree no. 716/Kpts/Um/10/1980. The loggerhead turtles are rare in Indonesia, but there are unconfirmed reports mentioned that they may be nesting in the province of Maluku, where they are found feeding (Salm and Halim 1984). Loggerhead turtles can also be found feeding in waters close to Taka Bona Rate atoll, south of Sulawesi (Wicaksono 1992).

6. Flatback (*Natator depresus*)

The local people called it as Penyu Pipih. This species got protection status more since 1992 based on Ministerial of Forestry decree no. 882/Kpts-II/1992 and is currently unexploited species in Indonesia. This species ventures into Indonesian waters to feed only and nests exclusively in Australia. As such, it must be considered a shared resource. This species is fully protected in Australia, as are all other marine turtles species. It was found feeding in Irian Jaya, but never found nesting (Sumardja 1991, Limpus 1993, Kitchener 1996). The above statements should be corrected, since Nababan and Jacob (1996) found one nest of Flatback on Jamursba-Medi beach in 1995. (See table 1)

CONSERVATION AND MANAGEMENT PROGRAM

1. National level

(a) Marine Turtle Policy

In essence, local legislation provides that species shall be protected, regulated and used for the benefit of humankind now and for the future. Specific to marine turtles, conservation efforts are necessary to promote wise and sustainable use of the species to ensure their continued survival. Legal instruments in Indonesia that provide for the conservation and protection of marine turtles include:

- The Indonesian Constitution of 1945; article 33, all of the resources must be used as the greatest for humankind prosperity of the Indonesian.
- Act no. 5 of 1967; basic provision on forestry included conservation area management for marine turtle habitat.
- Act no. 4 of 1982, basic provision for the management for living resources environment.
- Act no. 9 of 1985, chapter 1 article 2 provides that fishery resources consist of all kinds of fish, including other aquatic biota such as turtles, dolphins, seaweed's, corals etc. Chapter 1 article 4 provides that the utilization of fishery resources means fishing and cultivating. Chapter 8 article 1 provides that for the sake of science, culture or conservation of aquatic nature, the government has established that certain kinds of fish and/or certain aquatic locations are protected as aquatic wildlife reserves because of the specific conditions of the aquatic areas.
- Act no. 5 of 1990, Conservation of Living Resources and Their Ecosystems; the act regulates; the management of wildlife and endangered species, the establishment of marine conservation areas, the utilization and cultivation of wildlife (including turtles), the monitoring and supervision of their utilization and conservation as well.
- Government Regulation of the Republic of Indonesia no. 7/1999 concerning flora fauna preservation. All of six marine turtle species occurring in Indonesia are in the list of endangered species, this include green turtle (*Chelonia mydas*).
- Government Regulation of the Republic of Indonesia no. 8/1999 concerning the utilization of flora & fauna. The utilization of hawksbill turtle can be done on the second generation of ranching production as commodity

In line with the above policies, the Indonesian government has declared all of the six species of marine turtles exist in Indonesia as endangered and protected animals. These species are; Penyu Sisik-hawksbill (*Eretmochelys imbricata*), Penyu Belimbing-leatherback (*Dermochelys coriacea*), Penyu Lekang-olive ridley (*Lepidochelys olivacea*), Penyu Tempayan-loggerhead (*Caretta caretta*) and Penyu Pipih-flatback (*Natator depressus*). Only one remaining, the most common species in Indonesia, Penyu Hijau-green (*Chelonia mydas*) is just start protected in this year (1999). However, due to its relative abundance and its use in traditional Hinduism ceremonies in Bali, the green turtle is still legally harvested under a careful quota system. The green turtle quota for 1993 is 5,000 turtles. Most of them allocated for Bali Island. It is acknowledged that the yearly harvest may exceed the endorsed quota due to difficulties in maintaining control.

(b) Action Plan

The action programs listed below have been undertaken to save the turtle species. These are aimed to increase conservation efforts to protect turtles and their habitats by:

- Enhancing conservation areas for marine turtles primarily for habitats that are most vulnerable to human disturbance such as nesting beaches and marine areas where juveniles, subadults and breeders occur;
- Conservation awareness programs focusing on saving marine turtles;
- Strengthening knowledge, capabilities and facilities for marine turtle conservation;
- Management and control of green turtles utilization including the regulation of eggs harvesting;
- Marine turtle research and development.

Presently, the government is putting emphasis on the first two action plans. Many nesting habitats have been declared as protected areas. Private beach ownership has been abandoned. Fishing zones have already been designated, established and regulated by the Ministry of Agriculture.

(c) Marine Turtle Programs

The continued threatened status of marine turtles in Indonesia and in the world in general mandates Indonesia to develop aggressive and comprehensive short and long-term programs to accelerate population recovery. The immediate goal of any conservation is to arrest population decline. The ultimate goal is to provide the conditions that will stabilize the breeding populations to a sustainable level.

The following are short-term programs that have been developed and implemented to save the marine turtle:

- Turtle habitat survey and inventory. As a result of the surveys, 143 nesting beaches throughout the country have been identified (see appendix 1);
- Designation of nesting beaches as conservation areas. Until now, 37 marine protected areas with marine turtle nesting site has already established and 50 areas are still being proposed.
- Conservation awareness campaign. Conservation officers, NGOs and students conduct this activity. The target communities are fishermen and people who live along and near the coastal zone.
- Regulation and monitoring of green turtle egg collection. Egg collection is regulated through limited harvest and juvenile restocking system that is usually done by a cooperative owned by the community.

Long-term programs on the other hand consist of the following;

- Research and development on population, migration and rehabilitation of populations and habitats;
- Regional management and control of marine turtle exploitation (ASEAN and Pacific Region);
- Formulation of an educational curriculum for marine turtle conservation;
- Development of an efficient information system and GIS for marine turtle conservation;
- Development of a system that will ensure the sustainability of the resource;
- Establishment of a specific institution mandated to manage and conserve marine turtles in Indonesia; and
- Upgrade the capability of the PHPA for management and conservation of marine turtles.

Many agencies and organizations in Indonesia are involved in marine turtle research and management. The Directorate General of Nature Protection and Conservation (PKA) of the Ministry of Forestry and Estate Crops is involved in several marine turtle conservation projects, including a hawksbill project on Pramuka Island, north of Jakarta and nesting beach management throughout Indonesia. The Ministry of Environment is also active in marine turtle conservation and coordinated the production of the National Marine Turtle Conservation Strategy and Action Plan in 1991 (Subagio 1991; Sumarja 1991; Sutikno 1991). The Directorate General of Fisheries of the Ministry of Agriculture recently conducted a workshop in Tegal, West Java, on the use of turtle-excluder devices (TEDs). The use of TEDs in fisheries has already announced since the decree of Ministry of Agricul-

ture, no. 930/Kpts/Um/12/1982 was issued in 1982. This aims of this regulation are to minimize the incidental catch of the turtle and non target species (Sukresno, 1997). In addition to the government agencies, the Indonesian universities, often in cooperation with the above agencies, conduct research into biology and ecology of marine turtles. Several NGOs (Non Government Organizations) are also involved in marine turtle conservation. The Worldwide Fund for Nature (WWF) has projects focusing on conservation in the field and also has an office in Bali, which concentrates on awareness and education in relation to marine turtle utilization. Wetlands International - Indonesia Program is involved in environmental education which includes the plight of marine turtles. A large number of other - both international and smaller, national - NGOs, conduct surveys and awareness campaigns related to marine turtle conservation in Indonesia.

Local community participation in marine turtle conservation has been established in several places in Indonesia. PKA, through one of its KSDA (Konservasi Sumber Daya Alam) offices in Irian Jaya, is currently cooperating with local people around Jamursba-Medi in a joint KSDA-WWF Indonesia Program Project aiming at protecting the leatherback nesting beaches by combining conservation with development of the local communities. Community participation has also been tried in the Aru Islands as a means to efficient conservation of the islands considerable green turtle population (Ating 1991). A very successful example of local community participation is Proyek Penyu in Pemuteran village north Bali, where local people assist in the protection of the marine turtles of the area.

The importance of marine turtle conservation efforts in Indonesia have been shown and is identified as part of the Biodiversity Action Plan for Indonesia (BAPPENAS 1993). A further emphasis of the importance marine turtles is revealed by visitation of the former President Soeharto to the joint PHPA-Japan Bekko association hawksbill project in the Pramuka-Seribu Islands, north of Jakarta, on 27 October 1996. Accompanied by the former German Chancellor, Mr. Helmut Kohl, the President released more than 500 hatchlings and juvenile (up to two and a half years) hawksbill turtles to the wild.

2. Regional level

A memorandum of understanding (MOU) on ASEAN Sea Turtle Conservation and Protection was signed on 12 September 1997 among the government of ASEAN countries; Indonesia, Brunei, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. The MOU was signed in recognition of the significance of marine turtle populations and their habitats in ASEAN waters; that marine turtles are migratory species and that the waters of ASEAN countries form a contiguous area of waters without any interval; that effective conservation efforts cannot be independently realized at the national level and that multilateral efforts are necessary to ensure the long term survival of sea turtles in the ASEAN region.

Indonesia fully supports this MOU for example; the new Indonesian government regulation no. 7 of 1999 which is issued very recently in this year that declared all of six species of marine turtle exist in Indonesia as protected animals. It means, that the green turtle status is a protected animal now.

3. International level

Since Indonesia joined the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on 28 March 1979, the export of marine turtle products has been legally prohibited under CITES. In this case, PKA is pointed out as a management authority for international trade in endangered species of wild flora fauna and LIPI (Indonesian Scientific Research Center) as a scientific authority. Then Indonesian government has adopted the CITES

convention through the Presidential decree no. 43/1978, then it is followed up to the adoption of United Nations Convention on Biological Diversity in Rio de Janeiro-Brazil, 1992 by Act of Republic of Indonesia no. 5/1994.

PROBLEM

Currently, the major problem of marine turtle management and conservation in Indonesia are;

1. National Marine Turtle Strategy had been produced and discussed among some agencies involved in marine turtle management and conservation in 1991, but implementation of the result from this discussion is ineffective due to lack of formal legitimization.
2. In certain places, the marine turtles are still as the main importance source of the fresh red meat for local people who live on coastal area, far away from the mainland. The Hinduism in Bali uses turtle meat as "holy meat" for their ceremonial.
3. There are no reliable information regarding the population dynamic and biological data of marine turtles.
4. Due to the limited number of conservation officers, the control and enforcement of law against illegal hunting and harvesting of marine turtles are ineffective.
5. Although the government has already declared all of six species of marine turtles as protected animal, illegal exploitation of eggs harvest, tortoiseshell and turtle trade are still going on. This shows that conservation awareness is still a problem.

RESEARCH ACTIVITIES

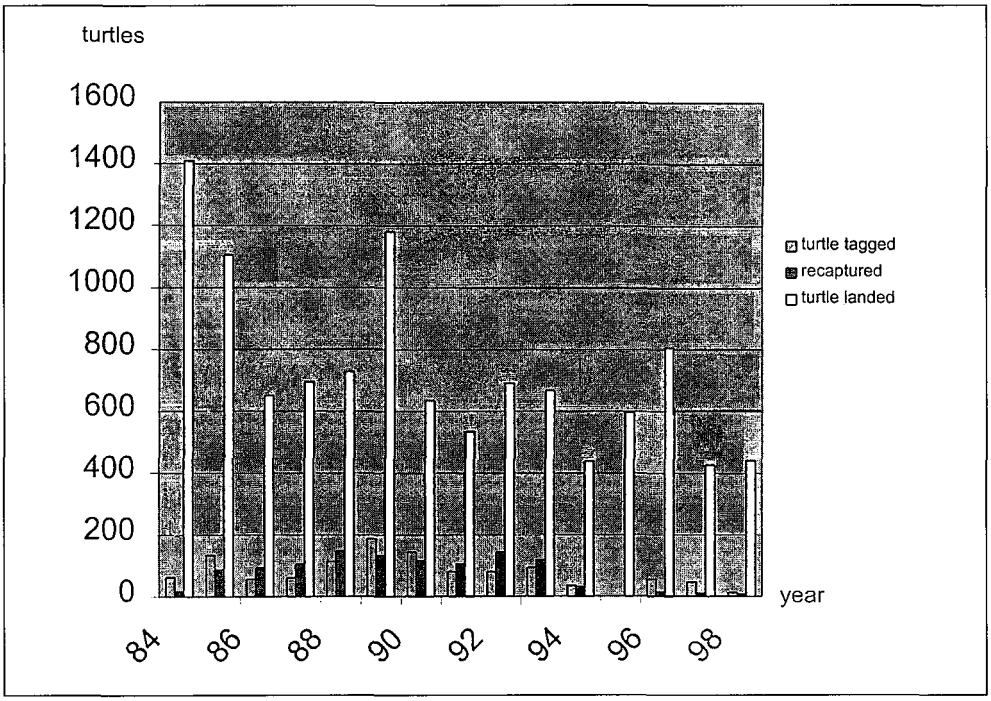
Despite of the widespread distribution and species diversity of marine turtles in Indonesia, limited research has been conducted on their biology and its management, particularly hawksbill turtle. Most studies of turtles have been lasted in short time and were confined to the nesting beaches on Java and nearby islands (Erwan 1980; Nuitja *et. al.* 1979; Rekoswardojo 1961; Salm 1981; Silalahi 1976; Sunawan 1978). Some authors namely, Nuitja and Akmad (1982), Polunin and Nuitja (1979), then Salm and Halim (1984) have reviewed and summarized existing knowledge on turtles and their exploitation. Shulz 1984, 1989; Kitchener 1996 can obtain only little information available from limited studies. Consequently, the data on population sizes and dynamics, including the ecology and behavior which supports the management of marine turtle utilization and conservation we still lacking. Experiences showed in the past, that several marine turtle conservation has been initiated with varying success. With the increasing interest on marine turtle in Indonesia, particularly in its conservation efforts the ecology and distribution data of turtles are needed. Head starting and tagging marine turtles activities has being done in several conservation areas such as; Kepulauan Seribu National Park; Meru Betiri NP; Alas Purwo NP; Pangumbahan Beach and Cikepuh Wildlife Reserve. In this year, monitoring post nesting migration for hawksbill turtle will be done in Seribu Islands, Java Sea and Jamursba-medi Beach, Irian Jaya for leatherback.

Some research activities on marine turtle are still running in some marine conservation areas as follows;

1. Tagging program

Tagging activities on green turtles have been done quite intensively on Sukamade Beach, Meru Betiri National Park since 1984 till now. During 1984 to 1998, the green turtle tagged has already as many 1,172 turtles (mostly female) and the recaptured turtles are 1,135. This recaptured data do not mention of the multi recaptured of green turtle tagged. However, method of the recording should be improved in order to be able to estimate the green turtle population in Meru Betiri NP. (see figure 5).

Figure 5: Comparison of the marine turtle tagged, tagged recaptured and turtle landed in Sukamade beach, Meru Betiri NP



Japan Bekko Association funds the hawksbill turtle tag-monitoring program was started since June 1995 until now. At present, 124 hawksbill turtles has been tagged and 2 of them recaptured by fishermen accidentally at the same place when the turtle were released (see appendix 2).

2. Head starting program

Head starting activity of hawksbill is conducted in Kepulauan Seribu NP in this activity the size and rate growth of hatchlings is recorded, then size and weight of eggs is measured as well. The hatching activities in 1997 & 1998 can be shown in appendix 1,2 & 3.

3. Nest monitoring program

Nest monitoring by counting the body pit of hawksbill turtle is continuing in Kepulauan Seribu, Belitung and Segamat. This activity is a joint project between PKA-JBA, which is still, be run until June 2000.

4. Satellite tracking program

The monitoring of post nesting hawksbill will be done in this year by using ST-10 PTTs unit in Kepulauan Seribu National Park. There are 3 unit of the transmitter will be attached on the carapace of adult female hawksbill and will be monitored by ARGOS satellite (from France) for 6 months. Then at Jamursba-medi beach in Irian Jaya, the satellite-tracking program also will be conducted on Leatherback.

5. mtDNA analysis of hawksbill

This mtDNA analysis from tissue samples of hawksbill is still going on in Kyushu University, Fukuoka – Japan in collaboration with PKA-Dept of Forestry and Estate Crops, Republic of Indonesia. However, some more tissue samples is still needed, especially the hawksbill who live in Indian Ocean.

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Marine Turtle Nesting Area Throughout Indonesia (refer to accompanying map).

No.	Province and Location	Species					
		1[3]	2[4]	3[5]	4[6]	5[7]	6[8]
I	ACEH						
1	Kepulauan Banyak	+	+	-	-	-	
2	Pulau Beras, P. Nasi	+	-	-	-	-	
II	NORTH SUMATRA						
3	Pulau Musala	-	+	-	-	-	
4	Kepulauan Batu	+	+	-	+	+	
III	RIAU						
5	Pulau Durani	+	+	-	-	-	
6	Kepulauan Riau, Kepulauan Lingga	+	+	-	-	-	
7	Kepulauan Anambas	-	+	-	-	-	
8	Kepulauan Natuna Besar	-	+	-	-	-	
9	Kepulauan Tujuh (South Natuna)***[11]	-		-	-	-	
10	Pulau Midai	-	+	-	-	-	
11	Kepulauan Tambelan***	+	+	-	-	-	
IV	WEST SUMATRA						
12	Pulau Pasanam	+	+	-	-	+	
13	Pulau Siberut	+	+	-	-	+	
14	Pantai Selatan Padang	+	+	-	-	+	
15	Pulau Penyu***	+	+	-	+	+	
16	Pulau Sipura	-	-	-	-	+	
17	Pulau Kecil sekitar Pagai	-	+	-	-	-	
18	Pulau Pagai	-	+	-	-	-	
19	Pulau Sanding	+	-	-	-	-	
V	BENGKULU						
20	Pulau Mega	+	-	-	-	-	
21	Bengkulu (Pendek, Sawangkatung dan pantai antara Muko-muko Binduhan dan Pulau Tikus)	+	+	-	+	+	
VI	SOUTH SUMATRA						
22	Kepulauan Lima	+	+	-	-	-	
23	Pulau Kalimambang, Pulau Lengkuas	+	+	-	-	-	
24	Kepulauan Momperang	+	+	-	-	-	
25	Tanjung Rusa, Teluk Bolok	+	+	-	-	-	
26	Pulau Plemah-Manggar	+	+	-	-	-	
VII	LAMPUNG						
27	Keruai	+	-	-	-	-	
28	Tanjung Cina	+	-	-	-	+	

No.	Province and Location	Species					
		1[3]	2[4]	3[5]	4[6]	5[7]	6[8]
29	Tanjung Rakata, P Sertung	+	+	-	-	-	
30	Pulau Segama	+	+	-	-	-	
VIII	DKI JAKARTA						
31	Kepulauan Seribu	+	+	-	-	-	
IX	WEST JAVA						
32	Pulau Panaitan	+	-	-	-	-	
33	Ujung Kulon	+	+	-	-	+	
34	Citerem, Cubulakan	+	-	-	-	-	
35	Pangumbahan	+	+	-	-	-	
36	Cipatujah-Sindang Kerta	+	+	-	-	-	
37	Cikalong	+	-	-	-	-	
X	CENTRAL JAVA						
38	Nusa Kambangan**	+	+	-	+	-	
39	Kepulauan Karimun Jawa	+	+	-	-	-	
XI	EAST JAVA						
40	Pulau Bawean	+	-	-	-	-	
41	Nusa Barung	+	+	-	-	-	
42	Sukamade	+	+	-	+	+	
43	Bagian Barat Tl. Blambangan	-	-	-	-	+	
44	Blambangan	+	-	-	-	+	
45	Pulau Gili Yang	-	+	-	-	-	
46	Pulau Sagubing, P Saubi	+	+	-	-	-	
47	Pulau Araan	+	+	-	-	-	
48	Pulau Sepanjang	+	-	-	-	-	
XII	BALI						
49	Bali Barat**	-	+	-	-	-	
50	Nusa Penida dan Lebih	+	-	-	-	-	
51	Bualu	-	+	-	+	-	
XIII	WEST NUSA TENGGARA						
52	Lombok bagian Tenggara	+	-	-	-	-	
53	Sumbawa bagian Tenggara	+	-	-	-	-	
54	Ai-Ketapang	+	-	-	-	-	
55	Dara Mata	+	-	-	-	-	
XIV	EAST NUSA TENGGARA						
56	Pulau Komodo**	+	-	-	-	-	
57	Pulau Roti, Pulau Ndana	+	+	-	-	-	+
58	Pulau Semau	+	+	-	-	-	
59	Pulau Batek	-	+	-	-	-	

No.	Province and Location	Species					
		1[3]	2[4]	3[5]	4[6]	5[7]	6[8]
XV	WEST KALIMANTAN						
60	Paloh Sambas***						
61	Pulau Lemukutun						
62	Kepulauan Karimata*						
XVI	CENTRAL KALIMANTAN						
63	Kumai	+	-	-	-	-	
64	Tanjung Putting	+	-	-	-	-	
XVII	SOUTH KALIMANTAN						
65	Pleihari Tanah Laut**	+	-	-	-	-	
66	Tanjung Selatan	+	+	-	-	-	
67	Kepulauan Marabatua	+	-	-	-	-	
68	Kepulauan Laut Kecil***	+	+	-	-	-	
69	Pulau Birah-birahan	+	-	-	-	-	
70	Tanjung Layar	+	-	-	-	-	
71	Kepulauan Sambar Gelap***	+	-	-	-	-	
XVIII	EAST KALIMANTAN						
72	Pasir	+	-	-	-	-	
73	Balikpapan	+	-	-	-	-	
74	Pulau Birah-birahan	+	-	-	-	-	
75	Sankuriang	+	-	-	-	-	
76	Pulau Mataha, P. Bilang-bilangan	+	-	-	-	-	
77	Pulau Semama, P. Sangalaki*	+	+	-	-	-	
78	Pulau Maratua, P. Balikukup*	+	+	-	-	-	
79	Pulau, P. Balembangan	+	-	-	-	-	
XIX	NORTH SULAWESI						
80	Pulau Tangkoko-Batuangus**	+	+	-	-	-	
81	Tanjung Flores	+	-	-	-	-	
82	Kepulauan Karkaralong	+	-	-	-	-	
83	Kepulauan Nanusa	+	-	-	-	-	
84	Kepulauan Bunaken*	+	+	-	-	-	
85	Pulau Popaya, Pulau Mas**	-	-	-	-	-	
XX	CENTRAL SULAWESI						
86	Tanjung Arus-Tanjung Dako	+	-	-	-	+	
87	Pulau Simatang	+	-	-	-	-	
88	Siraru	+	-	-	-	-	
89	Pulau Pasoso	+	-	-	-	-	
90	Kepulauan Togian	+	+	-	-	-	
91	Kepulauan Banggai	+	-	+	-	-	

No.	Province and Location	Species					
		1[3]	2[4]	3[5]	4[6]	5[7]	6[8]
XXI	SOUTH SULAWESI						
92	Pulau Lari-larian	+	-	-	-	-	
93	Pulau Ambo	+	-	-	-	-	
94	Kepulauan Balangan, Kepulauan Mamuju	+	+	-	-	-	
95	Kepulauan Spermonde	+	+	-	-	-	
96	Kepulauan Masalima	-	+	-	-	-	
97	Kepulauan Kalukalukuang	-	+	-	-	-	
98	Kepulauan Dewakang	-	+	-	-	-	
99	Kepulauan Tengah	+	+	-	-	-	
100	Kepulauan Sabalana	+	+	-	-	-	
101	Tanjung Apatama	-	-	-	-	+	
102	Pulau Kayuadi	-	+	-	-	-	
103	Kepulauan Sembilan	+	+	-	-	-	
104	Taka Bone Rate*	+	+	+	-	-	
105	Pulau Kakabia***	+	-	-	-	-	
106	Pulau Sarege***	+	-	-	-	-	
107	Pulau Kauna	+	-	-	-	-	
108	Pulau Lalao	+	-	-	-	-	
XXII	SOUTHEAST SULAWESI						
109	Pulau Kabaena, Pulau Telaga Besar	-	+	-	-	-	
110	Padamarang	-	+	-	-	-	
111	Tanjung Kassolamatumbi	+	-	-	-	-	
112	Tanjung Tamponokora	+	-	-	-	-	
113	Pulau Manui	+	-	-	-	-	
114	Pulau Wowoni	-	+	-	-	-	
115	Pulau Saponda	-	+	-	-	-	
116	Lintea Tiwolu	+	-	-	-	-	
117	Binongko	+	-	-	-	-	
118	Pulau Batuata	-	+	-	-	-	
XXIII	MALUKU						
119	Pulau Weter	-	+	-	-	-	
120	Seira	-	+	-	-	-	
121	Kepulauan Aru Tenggara (P. Enu, P. Jeh, P. Karang) Kepulauan Penyu, Kepulauan Lucipara***	+	+	-	-	-	
122	Pulau Ambon	+	+	+	-	-	
123	Latuhalat, Pulau Pombo	+	-	-	-	-	
124	Pulau Kasa	-	+	-	-	-	
125	Pulau Seram Timur	-	+	-	-	-	
126	Pulau Parang	-	+	-	-	-	
127	Wahai	+	+	-	-	-	

No.	Province and Location	Species					
		1[3]	2[4]	3[5]	4[6]	5[7]	6[8]
128	Kayoa	-	+	-	-	-	
129	Morotai Utara	-	+	-	-	-	
130		-	-	-	-	+	
XXIV	IRIAN JAYA	+	+	-	-	+	
131	Pulau Sayang	+	+	-	-	+	
132	Kepulauan Ayu	+	+	-	-	+	
133	Kepulauan Asia	+	+	-	-	+	
134	Kepulauan Dua	+	+	-	-	+	
135	Pantai Utara Kepala Burung Irian Jaya (Vagelkop)	+	-	-	+	+	

No.	Province and Location	Species					
		1[3]	2[4]	3[5]	4[6]	5[7]	6[8]
136	Kepulauan Mapia	+	+	-	-	-	
137	Pulau Ayawi	+	+	-	-	-	
138	Kepulauan Auri, Teluk Cendrawasih*	+	+	-	-	-	
139	Inggresau	-	-	-	-	+	
140	Kepulauan Raja Ampat	+	+	-	+	-	
141	Pulau Tatauga, Pulau Sabuda	+	-	-	-	-	
142	Pulau Adi	+	-	-	-	-	
143	Pulau Dolok-Marauke	+	-	-	-	-	

[3]Green Turtle
[4]Hawksbill
[5]Loggerhead
[6]Olive Ridley
[7]Leatherback
[8]Flatback
[9]+Discovered
[10]-No evidence
[11]***Proposal priority for protected area
[12]*Protected area
[13]**Protected area being proposed for extended

Tagging and releasing of Hawksbill turtle in Indonesia
PHPA-JBA Project 1995-2000

No.	No.Tags		Material	Release	Carapace		Weight	Notes
	right flipper	left flipper		date & place	SSL cm	width cm	kg	
1.	2003	2004	metal	13/03/96 Air Isl.	48.0	37.5	9.8	from Kr. Lebar fisherman, FS
2.	2005	2006	metal	13/03/96 Go. Sekati	40.5	37.0	9.6	from Harapan Isl, fisherman, FS
3.	2011	2012	metal	13/03/96 Karya Isl.	46.1	46.0	12.6	Olive ridley, Peniki, fisherman
4.	2007	2008	metal	13/03/96 Karya Isl.	50.0	39.9	11.0	from Go. Sekati, fisherman, FS
5.	2009	2010	metal	13/03/96 North Pramuka	48.3	34.9	9.6	from Go. Sekati, fisherman, FS
6.	2013	2014	metal	13/03/96 Pramuka	48.3	39.4	10.8	from fisherman, FS
7.	2019 6002	2020 6003	metal plastic	29/08/96 Pramuka	35.9	31.5	4.4	from PHPA rangers, FS
8.	2015 6004	2016 6006	metal plastic	29/08/96 Pramuka	40.5	39.2	5.6	from fisherman, FS
9.	2017 6007	2018 6008	metal plastic	29/08/96 Pramuka	34.1	33.2	3.6	recaptured 21/6/97 size 43.4/34.6/8.8
10.	003 5002	- 5003	titan plastic	29/08/96 Pramuka	66.1	51.4	29.8	no left flipper (invalid), FS
11.	004 5004	005 5005	titan plastic	05/09/96 sgb	75.3	56.0	42.6	sgb, female
12.	6009	6010	plastic	27/10/96 Pramuka	19.4	15.1	0.8	hatching pramuka
13.	6011	6012	plastic	27/10/96 Pramuka	18.4	14.1	0.8	hatching pramuka
14.	6013	6014	plastic	27/10/96 Pramuka	18.5	14.1	0.8	hatching pramuka
15.	6015	6016	plastic	27/10/96 Pramuka	17.6	13.8	0.6	hatching pramuka

No.	No.Tags		Material	Release date & place	Carapace		Weight kg	Notes
	right flipper	left flipper			SSL cm	width cm		
16.	6017	6018	plastic	27/10/96 Pramuka	18.4	14.0	0.8	hatching pramuka
17.	6019	6020	plastic	27/10/96 Pramuka	14.9	14.5	0.6	hatching pramuka
18.	2021	2022	metal	27/10/96 Pramuka	27.9	19.2	2.0	from Opak Kecil
19.	2023	2024	metal	27/10/96 Pramuka	23.8	18.5	1.4	from Opak Kecil
20.	2025	2026	metal	27/10/96 Pramuka	24.4	19.0	1.4	from Opak Kecil
21.	2027	2028	metal	27/10/96 Pramuka	24.9	18.3	1.4	from Opak Kecil
22.	2029	2030	metal	27/10/96 Pramuka	28.2	21.3	2.0	from Opak Kecil
23.	2031	2032	metal	27/10/96 Pramuka	29.8	22.2	2.6	from Opak Kecil
24.	2033	2034	metal	27/10/96 Pramuka	33.9	24.1	3.4	from Opak Kecil
25.	2035	2036	metal	27/10/96 Pramuka	29.9	21.2	2.4	from Opak Kecil
26.	2037	2038	metal	27/10/96 Pramuka	24.5	18.7	2.6	from Opak Kecil
27.	2039	2040	metal	27/10/96 Pramuka	23.1	17.3	1.4	from Opak Kecil
28.	2041	2042	metal	27/10/96 Pramuka	24.0	18.9	1.8	from Opak Kecil
29.	2043	2044	metal	27/10/96 Pramuka	26.0	20.9	1.8	from Opak Kecil
30.	2045	2046	metal	27/10/96 Pramuka	22.6	18.2	1.4	from Opak Kecil
31.	2047	2048	metal	27/10/96 Pramuka	24.0	18.4	1.6	from Opak Kecil
32.	2049	2050	metal	27/10/96 Pramuka	29.5	22.4	2.4	from Opak Kecil
33.	2054 5006	2053 5007	metal plastic	25/11/96 Pramuka	48.0	40.9	14.0	green turtle
34.	2051	2052	metal	06/02/97 Pramuka	34.8	27.9	4.0	recaptured Pramuka 23/05/98 size 49.0/38.4/12.6

No.	No.Tags		Material	Release date & place	Carapace		Weight kg	Notes
	right flipper	left flipper			SSL cm	width cm		
35.	2055	2056	metal	06/02/97 Pramuka	32.7	26.7	3.4	from fisherman, FS
36.	2057	2058	metal	06/02/97 Pramuka	29.4	22.2	2.4	from fisherman, FS
37.	6101	6102	plastic	no data Pramuka	13.4	11.1	0.3	hatching pramuka, random 1
38.	2059	2060	metal	22/02/97 Pramuka	38.5	32.2	5.0	from fisherman, FS
39.	2061	2062	metal	04/03/97 Pramuka	36.9	30.8	4.1	from fisherman, FS
40.	2063	2064	metal	14/03/97 Pramuka	21.4	16.6	1.2	from fisherman, FS
41.	2065	2066	metal	no data, Pramuka	43.9	34.5	8.2	from fisherman, FS
42.	2067	2068	metal	no data, Pramuka	44.7	37.3	8.6	from fisherman, FS
43.	2069	2070	metal	no data, Pramuka	39.9	32.1	5.8	from fisherman, FS
44.	2071	2072	metal	no data, Pramuka	34.6	28.1	3.2	from fisherman, FS
45.	2073	2074	metal	no data, Pramuka	27.4	22.5	2.2	from fisherman
46.	007	-	titan	no data, Pramuka	51.3	40.2	13.2	from fisherman, FS
47.	2075	2076	metal	no data	38.0	31.9	5.6	green turtle, fisherman
48.	2077	2078	metal	no data	21.4	16.2	1.2	from fisherman, FS
49.	2965	2966	metal	no data	14.1	11.1	0.3	hatching pramuka
50.	2982	2983	metal	no data	13.3	11.0	0.2	hatching pramuka
51.	2985	2984	metal	no data	15.4	12.7	0.4	hatching pramuka
52.	2955	2956	metal	no data	14.0	11.1	0.3	hatching pramuka
53.	2976	2967	metal	no data	12.4	9.8	0.2	hatching pramuka

No.	No.Tags		Material	Release date & place	Carapace		Weight kg	Notes
	right flipper	left flipper			SSL cm	width cm		
54.	2994	2995	metal	no data	15.0	12.0	0.3	hatching pramuka
55.	2992	2993	metal	no data	12.6	10.3	0.2	hatching pramuka
56.	2080	2090	metal	18/06/97	38.3	29.6	5.4	from fisherman, FS
57.	2091	2092	metal	06/06/97	34.9	27.6	3.4	from fisherman, FS
58.	2082	2083	metal	02/09/97	38.5	30.8	5.0	PHPA rangers, Kr. Beras, FS
59.	2084	2985	metal	04/09/97	30.5	24.3	3.0	from Pari / fisherman, FS
60.	021	022	titan	11/10/97	46.4	39.3	13.2	green turtle, fisherman
61.	023	024	titan	11/10/97 Pramuka	43.9	35.3	9.0	from fisherman, FS
62.	2093	2094	metal	18/10/97	46.4	37.1	10.2	from fisherman, FS
63.	2095	2087	metal	18/10/97	38.4	34.0	5.4	from fisherman, FS
64.	2096	2097	metal	18/10/97	30.1	23.0	2.6	from fisherman, FS
65.	2102	2103	metal	18/10/97	33.3	27.4	3.4	from fisherman, FS
66.	2104	2105	metal	18/10/97	36.7	23.0	4.0	from fisherman, FS
67.	2106	2107	metal	24/10/97	32.5	26.5	3.4	from fisherman, FS
68.	2108	2109	metal	24/10/97	37.6	31.3	4.6	from fisherman, FS
69.	2110	2111	metal	24/10/97	40.9	34.9	6.4	from fisherman, FS
70.	2145	2146	metal	10/11/97	32.3	24.5	3.0	from fisherman, FS
71.	2147	2148	metal	10/11/97 Kotok Besar	33.5	27.0	3.6	from fisherman, FS
72.	600	800	titan	18/11/97 Pramuka	58.6	43.9	18.0	from fisherman, FS

No.	No.Tags		Material	Release date & place	Carapace		Weight kg	Notes
	right flipper	left flipper			SSL cm	width cm		
73.	2112	2113	metal	29/11/97	33.3	27.2	3.2	from fisherman, FS
74.	2114	2115	metal	13/12/97	46.9	41.5	13.8	green turtle
75.	082	085	titan	20/12/97 sgb	79.5	58.0	no data	sgb, female
76.	084	086	titan	20/12/97 sgb	78.0	64.5	no data	sgb, female
77.	088	090	titan	23/12/97 sgb	81.4	59.4	no data	sgb, female
78.	077	078	titan	08/12/97 sgk	77.0	56.0	no data	sgb, female
79.	079	080	titan	08/12/97 sgb	80.0	57.0	no data	sgk, female
80.	081	083	titan	16/12/97 sgb	81.0	61.5	no data	sgb, female
81.	2190	2191	metal	11/03/98	28.7	23.0	2.0	from fisherman, FS
82.	2274	2275	metal	23/03/98	16.8	13.3	0.6	hatching result 96-47
83.	2272	2273	metal	23/03/98	18.4	14.5	0.6	hatching result, random 1
84.	2270	2271	metal	26/03/98 Pramuka	36.4	30.1	4.2	from fisherman, Air, FS
85.	012	011	titan	29/03/98 sgb	82.3	61.2	no data	sgb, female
86.	091	093	titan	15/04/98 Pramuka	42.1	34.0	6.6	from fisherman, FS
87.	027	026	titan	21/05/98 Pramuka	50.8	41.2	13.2	from fisherman, FS
88.	2149	2150	metal	24/05/98	32.7	25.6	3.4	from fisherman, FS
89.	2226	2227	metal	03/07/98	45.4	36.4	7.2	from fisherman, FS
90.	2300 6238	- -	metal plastic	26/06/98	25.2	23.8	2.0	olive ridley, sgb, left flippers were cut off by gill net
91.	2228	2229	metal	23/08/98	29.1	25.9	3.2	green turtle, fisherman

No.	No.Tags		Material	Release date & place	Carapace		Weight kg	Notes
	right flipper	left flipper			SSL cm	width cm		
92.	073	075	titan	30/08/98	35.9	31.2	5.6	from fisherman, FS
93.	2230	2231	metal	30/08/98	29.7	23.4	2.0	from PHPA rangers, FS
94.	018	049	titan	02/09/98	4.5	36.5	11.0	trapped in kr. lebar by fisherman, FS
95.	054	055	titan	P. Pesemut				green turtle, P. Pesemut/ Belitung
96.	2288	2296	metal	03/09/98 Pramuka	35.8	29.9	4.4	from fisherman, Panggang
97.	2291	2298	metal	03/09/98 Pramuka	42.4	34.6	6.6	from fisherman, Panggang
98.	2282	2297	metal	03/09/98 Pramuka	36.7	32.3	4.8	from fisherman, Panggang
99.	2276	2299	metal	03/09/98 Pramuka	33.3	26.2	3.0	from fisherman, Panggang
100.	2184	2185	metal	10/11/98 Pramuka	39.3	32.0	6.0	from Air
101.	2186	2187	metal	10/11/98 Pramuka	39.5	32.1	6.0	from Kelapa
102.	2188	2189	metal	10/11/98 Pramuka	42.6	35.3	7.4	from Kelapa
103.	074	047	metal	10/10/98 Pramuka	52.0	40.0	14.6	from Pramuka
104.	048	099	metal	10/11/98 Pramuka	51.6	40.5	15.6	from Kr. Lebar
105.	2280	2281	metal	10/11/98 Pramuka	47.7	38.6	11.0	from Air
106.	2282	2283	metal	13/10/98 Pramuka	42.9	34.2	7.6	Kr. Lebar
107.	2284	2285	metal	25/10/98 Semak Daun	45.7	34.8	11.0	Kr. Lebar
108.	014	-	metal	25/10/98 Semak Daun	55.6	44.8	18.8	Green turtle from Sea world
109.	015	-	metal	25/10/98 Semak Daun	58.6	46.7	23.4	Green turtle from Sea world

No.	No.Tags		Material	Release date & place	Carapace		Weight kg	Notes
	right flipper	left flipper			SSL cm	width cm		
110.	2201	2202	metal	25/10/98 Semak Daun	56.2	46.7	22.0	Green turtle from Sea world
111.	2203	2204	metal	25/10/98 Semak Daun	45.0	33.9	8.4	Sea world
112.	2205	2206	metal	25/10/98 Semak Daun	43.6	34.4	7.4	Sea world
113.	2207	2208	metal	25/10/98 Semak Daun	44.2	31.6	7.2	Sea world
114.	2209	2210	metal	25/10/98 Semak Daun	47.3	36.2	10.0	Sea world
115.	2211	2212	metal	25/10/98 Semak Daun	45.2	43.0	9.0	Sea world
116.	2213	2214	metal	25/10/98 Semak Daun	42.3	32.3	6.2	Sea world
117.	2215	2216	metal	25/10/98 Semak Daun	34.5	29.1	5.6	Green Turtle from Sea world
118.	2217	2218	metal	25/10/98 Semak Daun	39.0	32.5	5.2	Green Turtle from Sea world, recaptured 7/12/98, S. Daun, (39.1; 32.6; 5.4), released back at Pramuka
119.	2219	2220	metal	25/10/98 Pramuka	37.6	31.1	5.4	Green Turtle, Sea world
120.	2251	2252	metal	07/12/98 Pramuka	40.0	32.5	5.4	from fisherman
121.	2223	2293	metal	20/02/98 Pramuka	36.0	31.5	5.4	Green Turtle,
122.	2221	2222	metal	01/03/99 Pramuka	37.5	31.5	4.0	
123.	2261	2225	metal	18/03/99 Pramuka	40.5	33.4	7.4	Green Turtle from fisherman

No.	No.Tags		Material	Release date & place	Carapace		Weight kg	Notes
	right flipper	left flipper			SSL cm	width cm		
124.	2129	2124	metal	11/04/99 Pramuka	41.5	33.4	7.2	fisherman
125.	2954	2978	metal	11/04/99 Pramuka	19.0	14.7	0.8	97-2
126.	2235	2236	metal	11/04/99 Pramuka	21.6	16.5	1.4	R3
127.	2237	2238	metal	11/04/99 Pramuka	25.3	20.1	2.0	97-2
128.	2240	2241	metal	11/04/99 Pramuka	26.5	20.1	2.2	96-61
129.	2244	2245	metal	11/04/99 Pramuka	28.8	21.7	2.8	97-1
130.	2233	2234	metal	11/04/99 Pramuka	24.4	17.7	1.8	97-9
131.	2246	2247	metal	11/04/99 Pramuka	33.9	24.7	3.6	R3
132.	2248	2249	metal	11/04/99 Pramuka	20.3	15.6	1.0	97-1
133.	2968	-	metal	11/04/99 Pramuka	15.0	11.6	0.4	98-2
134.	2971	-	metal	11/04/99 Pramuka	13.2	10.1	0.2	98-2
135.	2979	-	metal	11/04/99 Pramuka	11.8	9.0	0.2	98-16
136.	2962	-	metal	11/04/99 Pramuka	12.6	10.7	0.3	97-23
137.	2998	-	metal	11/04/99 Pramuka	12.9	10.0	0.3	98-1
138.	2991	-	metal	11/04/99 Pramuka	12.3	9.6	0.2	98-13
139.	2193	2194	metal	13/04/99 Pramuka	35.8	26.9	4.6	R1
140.	2195	2196	metal	13/04/99 Pramuka	41.3	32.2	6.0	R1
141.	2197	2198	metal	15/04/99 Pramuka	40.1	35.7	8.8	Green turtle from fisherman
142.			metal					

Legends:

ssl = standard straight length FS = foraging sample sgb = segamat besar isl. sgk = segamat kecil isl.

HATCHING ACTIVITY OF HAWKSBILL TURTLE'S EGGS IN AUGUST & DECEMBER 1997

No	Nest Number	Nesting Date	Locations	Clutch size			Hatched Date	Hatched Eggs			Unhatched Eggs			Hatching Success
				Good	Bad	Total		Live	Dead	Total	Embryo	No Embryo	Total	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1	97 - 17	26.8 .97	Peteloran Timur	130	32	162	2-3.10. 97	119	6	125	2	3	5	96.2%
2	97 - 18	6.12.97	Segamat Besar	148	2	150	28-29.1.98	121	7	128	10	10	20	86.5%
3	97 - 19	7.12.97	Segamat Kecil	148	0	148	30-31.1.98	125	3	128	6	14	20	86.5%
4	97 - 20	7.12.97	Segamat Besar	160	3	163	1-2.2.98	70	4	74	20	66	86	46.3%
5	97 - 21	9.12.97	Segamat Besar	165	5	170	27-28.1.98	89	2	91	17	57	74	55.2%
6	97 - 22	12.12.97	Segamat Besar	92	2	94	5-6.2.98	87	0	87	1	4	5	94.6%
7	97 - 23	14.12.97	Segamat Besar	160	5	165	8-8.2.98	118	3	121	8	31	39	75.6%
8	97 - 24	15.12.97	Segamat Besar	50	0	50	12-13.2.98	40	0	40	2	8	10	80.0%
9	97 - 25	15.12.97	Segamat Kecil	165	0	165	10-11.2.98	132	3	135	13	17	30	81.8%
10	97 - 26	17.12.97	Segamat Besar	162	5	167	12-13.2.98	24	4	28	7	127	134	81.8%
11	97 - 27	20.12.97	Segamat Besar	182	0	182	15-16.2.98	163	1	164	16	2	18	90.1%
12	97 - 28	20.12.97	Segamat Besar	96	8	104	18-19.2.98	48	1	49	23	24	47	51.0%
13	97 - 29	20.12.97	Segamat Besar	153	3	156	16-17.2.98	64	0	64	4	86	89	41.8%
14	97 - 30	22.12.97	Segamat Besar	150	5	155	16-17.2.98	76	9	85	18	47	65	56.7%
15	97 - 31	22.12.97	Segamat Kecil	144	2	146	17-18.2.98	124	2	126	2	16	18	87.5%
	Total			**2,105**	**72**	**2,177**		**1,400**	**45**	**1,445**	**148**	**512**	**660**	**68.6%**

Notes: Hatching Success = (11)/(5) x 100%
Bad = damaged eggs by wooden stick

ANNEX 2: HATCHING ACTIVITY OF HAWKSBILL TURTLE'S EGGS IN AUGUST & DECEMBER 1997

No	Nest Number	Nesting Date	Locations	Clutch size			Hatched Date	Hatched Eggs			Unhatched Eggs			Nesting Success	Hatching Success
				Good	Bad	Total		Live	Dead	Total	Embryo	No Embryo	Total		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1	98 - 1	27.2 .98	Segamat Besar	181	4	185	27-28.4.98	86	0	86	10	86	96	100.0%	47.5%
2	98 - 2	28.2.98	Segamat Besar	180	6	186	27-28.4.98	103	23	126	24	30	54	81.7%	70.0%
3	98 - 3	5.3.98	Peteloran Timur	158	3	161	29-30.4.98	53	2	55	7	96	1033	96.4%	34.8%
4	98 - 4	5.3.98	Peteloran Timur	134	3	137	4-5.5.98	37	0	37	9	88	97	100.0%	27.6%
5	98 - 5	22.3.98	Peteloran Timur	50	0	50	1-2.5.98	42	0	42	2	6	8	100.0%	84.0%
6	98 - 6	23.3.98	Penjaliran Timur	167	0	167	21-22.5.98	137	1	138	2	27	29	99.3%	82.6%
7	98 - 7	24.3.98	Segamat Besar	191	5	196	18-19.5.98	158	6	164	2	25	27	96.3%	85.9%
8	98 - 8	25.3.98	Segamat Besar	172	0	172	20-21.5.98	120	5	125	13	34	47	96.0%	72.7%
9	98 - 9	26.3.98	Segamat Besar	114	0	114	24-25.5.98	68	0	68	4	42	46	100.0%	59.6%
10	98 - 10	18.4.98	Peteloran Timur	118	10	128	3-4.6.98	57	1	58	21	39	60	98.3%	49.2%
11	98 - 11	31.5.98	Segamat Kecil	111	1	112	30-31.7.98	68	1	69	1	41	42	98.6%	62.2%
12	98 - 12	9.6.98	Segamat Besar	207	1	208	29-30.7.98	123	5	128	50	29	79	96.1%	61.8%
13	98 - 13	7.6.98	Segamat Besar	181	7	188	2-3.7.98	33	0	33	23	125	148	100.0%	18.2%
14	98 - 14	20.6.98	Segamat Besar	200	2	202	8.7.98	74	13	87	14	99	113	85.1%	43.5%
15	98 - 15	20.6.98	Segamat Besar	36	2	38	25-26.8.98	15	0	15	6	15	21	100.0%	41.7%
16	98 - 16	23.6.98	Segamat Besar	111	2	113	21-22.9.98	52	1	53	21	37	58	98.1%	47.7%
	Total			**2,311**	**46**	**2,357**		**1,226**	**58**	1,284	209	819	1,028	95.5%	55.6%

Notes: Nesting Success = (9)/(11) x 100%
Bad = damaged eggs by wooden stic

Hatching Success = (11)/(5) x 100%

Graph 1: Increasing of body size and body weight of the rearing turtle third period