# RESEARCH, CONSERVATION AND MANAGEMENT OF MARINE TURTLES IN THE PHILIPPINES

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## INTRODUCTION

In order to conserve and protect the remaining marine turtle populations in the Philippines, the Task Force Pawikan (vernacular for marine turtle), now referred to as Pawikan Conservation Project (PCP) was created by virtue of Executive Order 542 on June 26, 1979. The main objective of the PCP is to develop and implement conservation and protection policies to address the decline of marine turtle population in the country. Massive information and education programs have also become a major thrust of the project. Management-oriented scientific researches are conducted to ensure the survival and protection of the country's endangered marine turtle population. Three implementing units of the PCP have been instituted in order to attain these objectives, namely: 1) Resource and Management Unit, 2) Research and Investigation Unit and 3) Information and Service Extension Unit (De Veyra, 1994).

In 1982, the Ministry of Natural Resources (MNR, now the Department of Environment and Natural Resources [DENR]) issued Administrative Orders 8 and 34 declaring the establishment and protection of 8 islands in the provinces of Antigue, Palawan and Tawi-Tawi as marine turtle sanctuaries. But due to very limited resources (funds and equipment), conservation efforts have been concentrated only at the Baguan Island Marine Turtle Sanctuary (BIMTS), Turtle Islands, Tawi-Tawi (De Veyra, 1994).

Also in 1982, in recognition of the importance of the Turtle Islands in Tawi-Tawi as a major nesting population for green turtles, collection of turtle eggs was regulated as provide by MNR Administrative Order 33.

The BIMTS is the country's premier marine turtle research area because it has the most number of nesters in the Philippines and nesting activity is all year round. In brief, most of the researches were done on the island from 1988 onwards (See Appendix 1). The most recent research activity is the satellite telemetry conducted by the PCP, World Wildlife Fund (WWF)-Philippines and the Coastal Resource Management Project (CRMP) on October 1998.

For other parts of the country, the Regional Technical Director for Environmental Management and Protected Areas Services for each of the DENR regional offices were designated as Field Action Officers (FAO) whose function is to implement marine turtle conservation activities in their areas of duty. Some of the activities undertaken by the FAOs and their staff are tagging and releasing of incidentally caught or confiscated turtles, monitoring and confiscation of marine turtle by-products and conduct information and education campaigns for coastal communities. Pre-paid postcards are distributed to regional offices, non-governmental offices and individuals all over the country to document marine turtle sightings in the Philippines. Data collected from the reports and the habitat surveys conducted by the technical staff of the PCP has enabled the project to gather insights on the general distribution of marine turtles in the Philippines (De Veyra, 1994).

Collaborative undertakings with international (WWF-US, USAID, US Fish and Wildlife Services, McArthur Foundation, Sabah Parks of Malaysia) and local institutions (Kabang Kalikasan ng Pilipinas/ WWF-Philippines, Marine Turtle Foundation, Coastal Resource Management Project and other NGOs) has greatly amplified marine turtle conservation in the Philippines.

One of the most recent and significant undertakings is the establishment of the first transboundary agreement in the world on the conservation and protection of marine turtles, the Turtle Islands Heritage Protected Area (TIHPA). The agreement was signed by the Governments of Malaysia and the Philippines on May 31, 1996. The main objective of the TIHPA is to develop and implement a joint management program for the Philippine-Sabah Turtle Islands. On-going activities are being implemented by the PCP and the Sabah Parks of Malaysia.

Even with the efforts being done, with the present lack of logistics and funds of the PCP, there is a need for greater effort nationwide on conservation of marine turtles in the country.

## POPULATION AND DISTRIBUTION OF MARINE TURTLES

There are five species of marine turtles that occur in the Philippines, namely: green turtle (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), olive ridley (*Lepidochelys olivacea*), loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*).

The green turtles are widely found throughout the country, with high nesting aggregations in Turtle Islands and the San Miguel Group of Islands, both in Tawi-Tawi. The decline in the green turtle population is attributed to massive egg harvests that have been in progress for the past 43 years (PCP data). In the Philippine Turtle Islands for example, the egg production of Taganak Island was 137,254 from August 8 to September 11, 1951 (Domantay, 1953). Data collected by the PCP from 1984 to 1993 in the same island on the same dates revealed that there was a 81.43% decrease in egg production (De Veyra, 1994).

The hawksbill is also widely distributed in the Philippines. However, unlike the green turtle, there is no known major aggregation of hawksbills throughout the archipelago. Lagunoy Gulf in the Bicol region has been identified as a developmental habitat of hawksbill turtles. The population of hawksbills is severely decimated as a result of excessive exploitation of eggs and the high international demand for tortoiseshell (De Veyra, 1994).

Although very few, olive ridleys, loggerheads and leatherbacks are found in the Philippines. In the early 1900's Taylor reported that olive ridleys were quite common in Manla Bay (De Veyra, 1994). Confirmed sightings have been reported in Luzon (Lingayen Gulf in La Union, Malabon and Bataan near Manila Bay, Subic Bay in Zambales, Lian in Batangas, Apo Reef in Mindoro, province of Palawan, Ragay Gulf in Quezon, Lagonoy and Albay Gulfs in the Bicol region, Sta. Cruz in Marinduque), Visayas (Himamaylan, Pontevedra and Sipalay in Negros Occidental, San Joaquin in Iloilo, Carigara Bay and Palompon in Leyte, Santander in Cebu) and Mindanao (Lianga Bay in Agusan del Norte).

Photos of loggerhead turtles by Seale (1911 and 1913) and Taylor (1921 and 1921) were the first documentation. But Nishimura (1967) doubted the taxonomic classification of the species described by Taylor because loggerhead turtles are known to be warm temperate species. However, there are two documented tagged loggerhead turtles from Japan. These turtles were caught by fishers in Pilas Island, Basilan in 1992 and Rapu-Rapu, Albay in 1993 (De Veyra 1994). In 1997 and 1998, confirmed sightings of tagged loggerheads in the Philippines were from Honda Bay in Palawan, Bais in Negros Oriental and Cortes in Bohol.

Leatherback turtles are occasionally caught by local fishers in southern Luzon specifically in Catanduanes, Daet and Albay Gulf within the Bicol region. In 1997 and 1998, there were two confirmed reports from Salay City in Negros Occidental and Mambajao in Camiguin. No nestings have yet been documented in the Philippines.

## NESTING SEASON AND EGG COLLECTION

The Philippine-Sabah Turtle Islands is considered as one of the 16 major rookeries of marine turtles in the world and the only remaining major nesting area of green turtles in the ASEAN region.

Since the 1950s, almost all turtle eggs produced in the Turtle Islands were harvested under the supervision of the Municipal Government through a bidding system. However, in 1982, in recognition of the importance of the resource, the National Government instituted through MNR Administrative Orders the following: 1) limited the collection of turtle eggs to only 60%, 2) designated January to March as a close season for egg collection and 3) declared Baguan Island, the most productive island, as a marine turtle sanctuary.

From 1984-1998, a total of 2,066 permits to collect turtle eggs were issued to the local residents of the area (Table 1). Only one permit per household is issued and this last for 4-7 days depending on the egg production season. Presently, 168 permits (representing 38% of the total households in Turtle Islands) are given annually by the PCP in coordination with the Municipal Government. The number of permits given per year is determined through the egg collection data gathered.

**Table 1: Annual Distribution of Permits in the Turtle Islands, Tawi-Tawi (1984-1998)**

| Year | No. of Permits Issued |
|---|---|
| 1984 | 37 |
| 1985 | 124 |
| 1986 | 94 |
| 1987 | 86 |
| 1988 | 141 |
| 1989 | 144 |
| 1990 | 156 |
| 1991 | 156 |
| 1992 | 156 |
| 1993 | 156 |
| 1994 | 156 |
| 1995 | 156 |
| 1996 | 168 |
| 1997 | 168 |
| 1998 | 168 |
| Total | 2,066 |

A permittee (one who is issued to collect turtle eggs within specified date and island) can earn from Php 5,000.00 to Php 15,000.00. The eggs are primarily sold in Sandakan, Sabah, Malaysia, the nearest market from Turtle Islands, Philippines (only 40 km between the two areas).

The present practice of selling of turtle eggs is in violation of CITES regulations. Thus, the problem is currently being addressed by both countries through the Joint Management Committee of the Turtle Islands Heritage Protected Area.

The normal peak season for turtle nestings in the Turtle Islands is from May to September. However, there are some years were the peak season starts at April and ends at October (Table 2). The Turtle Islands is visited yearly by more than 5,000 nesting turtles which was estimated from the PCP data of 1984-1998 (Table 3).

**Table 2: Monthly and annual distribution of complete nests in BIMTS (1984-1998)**

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1984 | | | | | | | 218 | 628 | 605 | 402 | 341 | 100 | 2,294 |
| 1985 | 274 | 156 | 214 | 238 | 254 | 261 | 369 | 399 | 496 | 511 | 415 | 265 | 3,852 |
| 1986 | 213 | 222 | 213 | 249 | 365 | 457 | 598 | 647 | 578 | 661 | 573 | 435 | 5,211 |
| 1987 | 410 | 253 | 215 | 241 | 396 | 429 | 387 | 453 | 389 | 461 | 97 | 355 | 4,086 |
| 1988 | 260 | 223 | 261 | 155 | 586 | 656 | 789 | 572 | 627 | 684 | 122 | 528 | 5,463 |
| 1989 | 286 | 345 | 168 | 348 | 816 | 682 | 784 | 736 | 794 | 679 | 297 | 259 | 6,194 |
| 1990 | 252 | 209 | 182 | 204 | 165 | 191 | 378 | 473 | 502 | 559 | 448 | 375 | 3,938 |
| 1991 | 509 | 593 | 629 | 659 | 787 | 815 | 1,260 | 1,208 | 1,067 | 835 | 566 | 453 | 9,381 |
| 1992 | 348 | 371 | 579 | 457 | 452 | 661 | 712 | 708 | 546 | 479 | 396 | 359 | 6,068 |
| 1993 | 344 | 327 | 581 | 748 | 817 | 750 | 850 | 782 | 738 | 812 | 634 | 538 | 7,921 |
| 1994 | 428 | 489 | 724 | 910 | 726 | 790 | 784 | 686 | 696 | 648 | 476 | 428 | 7,785 |
| 1995 | 445 | 521 | 931 | 1,160 | 1,526 | 1,853 | 1,437 | 1,289 | 1,756 | 692 | 441 | 260 | 12,311 |
| 1996 | 213 | 223 | 403 | 553 | 734 | 880 | 843 | 862 | 770 | 753 | 579 | 465 | 7,278 |
| 1997 | 384 | 406 | 613 | 802 | 1,318 | 1,760 | 1,885 | 1,439 | 969 | 648 | 374 | 251 | 10,849 |
| 1998 | 171 | 167 | 288 | 505 | 615 | 817 | 907 | 770 | 501 | 386 | 269 | 188 | 5,584 |
| Total | 4,537 | 4,505 | 6,001 | 7,229 | 9,557 | 11,002 | 12,201 | 11,652 | 11,034 | 9,210 | 6,028 | 5,259 | 98,215 |

**Table 3: Complete Nests in the Turtle Islands, Tawi-Tawi (1984-1998)**

| Year | Baguan | Lihiman | Langaan | Taganak | Bakkungan | Total |
|---|---|---|---|---|---|---|
| 1984 | 2,294 | 1,458 | 2,308 | 993 | 316 | 7,369 |
| 1985 | 3,852 | 1,150 | 1,639 | 1,424 | 142 | 8,207 |
| 1986 | 5,211 | 1,747 | 2,817 | 2,302 | 649 | 12,726 |
| 1987 | 4,086 | 1,327 | 1,243 | 1,829 | 107 | 8,592 |
| 1988 | 5,463 | 1,589 | 1,897 | 2,905 | 232 | 12,086 |
| 1989 | 6,194 | 1,566 | 1,407 | 3,146 | 391 | 12,704 |
| 1990 | 3,938 | 1,003 | 989 | 1,595 | 295 | 7,820 |
| 1991 | 9,381 | 2,456 | 1,382 | 2,981 | 306 | 16,506 |
| 1992 | 6,068 | 1,393 | 1,122 | 1,643 | 318 | 10,544 |
| 1993 | 7,921 | 1,979 | 1,777 | 2,445 | 393 | 14,515 |
| 1994 | 7,785 | 2,858 | 1,673 | 2,099 | 242 | 14,657 |
| 1995 | 12,311 | 3,486 | 2 364 | 3,264 | 347 | 21,772 |
| 1996 | 7,278 | 2,201 | 1,710 | 2,295 | 413 | 13,897 |
| 1997 | 10,849 | 2,916 | 2,257 | 2,378 | 462 | 18,862 |
| 1998 | 5,584 | 2,599 | 1,591 | 1,474 | 375 | 11,623 |
| Total | 98,215 | 29,728 | 26,176 | 32,773 | 4,988 | 191,880 |

## CONSERVATION AND MANAGEMENT PROGRAMS

Major on-going conservation and management projects/programs are the following:

1. Population Studies. This aims to establish the marine turtle distribution in the country through tagging activity. The DENR through the PCP and the Field Action Officers (FAOs) of the Regional Offices with the assistance of NGOs conduct this activity. The FAOs report regularly to the PCP on their accomplishment. In return the PCP sends Certificates of Appreciation and caps or T-shirts to those responsible for the report.

2. Information Education Campaign (IEC). This aims to enhance awareness on the conservation of marine turtles among the citizenry through the utilization of the electronic media and the traditional means of communication. The DENR through the PCP and the Field Action Officers of the Regional Offices with the assistance of NGOs conduct this activity. Presently, IEC is successful in the urban areas but in remote coastal areas where poverty is prevalent exploitation of marine turtles is still in progress.

3. Monitoring and Protection. This activity aims to monitor and confiscate endangered species being marketed in the country. The DENR through the Regional Offices conduct this activity but due to lack of manpower, logistics and funds, areas especially in inaccessible and remote areas, monitoring and protection activities are needed.

4. Web Page and Satellite Telemetry projects. The projects have 2 objectives, namely: 1) to establish the migratory routes of nesters from the Turtle Islands Heritage Protected Area (TIHPA) after their nesting activity and 2) to disseminate information internationally and locally on the satellite telemetry project and the TIHPA. A Memorandum of Agreement between the DENR through the PCP and the Coastal Resource Management Project, a special project funded by USAID and WWF-Philippines was signed on 1998 to conduct this project. On October 1998, 2 transmitters were attached on the carapace of 2 green turtle nesters in the BIMTS. Another set of transmitters will be activated in BIMTS and Selingaan Island, Sandakan, Sabah, Malaysia on July 1999. The launching of the web page is tentatively set on August 1999.

5. Turtle Islands Heritage Protected Area (TIHPA). A Memorandum of Agreement (MOA) was signed by the Governments of Malaysia and the Philippines on May 31, 1996. The MOA's main objective is to have a bilateral management of the Philippine-Sabah Turtle Islands. Even with the absence of a final management plan, there are on-going activities which involve the PCP, WWF-Philippines and Sabah Parks of Malaysia. On July 13, 1999, the Management Plan of the TIHPA will be finalized by the Joint Management Committee, the policy-making body of the TIHPA.

6. The Turtle Islands Integrated Conservation and Development Project (ICDP): A Collaborative Government and NGO Approach for Management (See Appendix 2).

## LITERATURE CITED

De Veyra, R.T.R. 1994. Status of Marine Turtles in the Philippines. Proceedings of the Fourtheenth Annual Symposium on Sea Turtle Biology and Conservation. South Carolina, USA. August 1994.

Palma, J.A.M. 1993. Marine Turtle Conservation in the Philippines. Paper presented during the First ASEAN Symposium-Workshop on Marine Turtle Conservation. Mla. Phil. 6-10 December 1993.

Trono, R and R.T. De Veyra. 1990. Evaluation of the reproductive potential of *Chelonia mydas* nesting population in Baguan Island Sanctuary. Haribon Foundation. Unpublished.

## PHILIPPINE RESEARCHES ON MARINE TURTLES

1. Nester-egg size relationship (Baguan Island Marine Turtle Sanctuary [BIMTS], 1988). This is to determine the relationship between the nester size and its egg size. Nesters were selected at random. A total of 1,263 eggs from 46 nesters were measured for this experiment. The results showed no significant relationship between the nester size and egg size in the nesting population of the island (Palma, 1993).

2. Relative fecundity of nesters (BIMTS, 1988). This is to estimate the number of eggs a nester lays in one breeding season. Fifty nesters were selected at random. The number of eggs laid and the duration in-between nesting activity were recorded.

   Out of the total number of samples, only nine were observed to have laid three times or more. The number of samples monitored were not enough to form a basis for a conclusion (Palma, 1993).

3. Clutch size as a factor in hatching and emergence success of *Chelonia mydas* (BIMTS, 1988). This is to establish the optimum number of eggs (clutch size) to ensure the highest hatching and emergence success which may be used in hatcheries. Initial data collected revealed that there was no relationship between the parameters mentioned (Palma, 1993).

4. Isolation and identification of fungi found in necrotic skin lesions of captive hawksbills (El Nido, Palawan, 1988). Skin scrapings from a total of 10 turtles were used as specimens for the isolation of fungi. All of the turtles exhibited necrotic skin lesions mostly on the head and neck.

   Based on direct microscopic examination of the skin scrapings, a tentative diagnosis of mycosis was made. However, to confirm the presence of fungi, isolation and identification of specific fungi found in the lesions were done.

   The isolates were identified as *Penicillium, Geotrichum, Fusarium, Scolecobasidium* and *Drechslera*. It was concluded that the disease is a management problem. The fungi isolated were opportunists and prediposing factors were necessary to initiate a disease. The turtles have been wounded first before contracting the disease (Palma, 1993).

5. Evaluation of the reproductive potential of *C. mydas* nesting population in BIMTS through the establishment of annual emergence percentage and sex-ratio of hatchlings (April 1989 to March 1990). This is to establish the hatching and emergence percentages and sex ratio of hatchlings emerging from the nesting beach of the BIMTS and utilize the data collected to asses the effectiveness of present conservation practices and design new conservation methods. Results showed that the annual hatching success and emergence percentage were 87.13% and 85.74%, respectively, which were significantly higher than the results obtained from the hatchery (49.90% and 47.78%). The mean incubation period was 54.32 days and average clutch size from 146 nests was 95.61. Histological examinations reveal that the male-female sex ratio was 1:8.6. Sex ratio obtained from hatchery samples was zero (0) male to one (1) female (Trono and De Veyra, 1990, unpublished report).

6. Hatchery experiments (BIMTS, 1988). Results from the unshaded hatchery experiment revealed that the hatching success was only 49.9% and the emergence percentage was 30.9%. The average incubation period was 48.39 days. The very low hatching and emergence percentages could be attributed to improper egg handling during translocation from natural nests to the hatchery (Palma, 1993).

7. In 1990, a portion of the BIMTS hatchery measuring 4 m x 23 m was completely shaded to attempt to simulate the conditions of the natural nesting beach. The experiment was conducted to evaluate the hatching and emergence percentages of artificially incubated eggs and determine the sex ratio

of hatchlings incubated in a shaded area. A histological examination of specimen gonads was done to determine the sex ratio (Palma, 1993). Below are the results of the experiment.

| Clutch Size (N6) | 60 | 65 | 70 | 75 | 80 |
|---|---|---|---|---|---|
| Emergence (%) | 88.23 | 86.15 | 82.32 | 86.08 | 83.59 |
| Hatchling Success (%) | 93.23 | 83.65 | 83.84 | 88.58 | 86.48 |
| Incubation Period (days) | 57.94 | 57.44 | 58.69 | 58.06 | 58.94 |
| Sex Ratio (M:I:F) | 6:3:7 | 9:4:3 | 4:5:7 | 2:5:9 | 6:6:4 |

8. Monitoring the physical abnormalities of green turtle hatchlings in the BIMTS, Turtle Islands, Tawi-Tawi. Thirty natural nests and 60 shaded and unshaded hatchery nests were monitored from July 4 to September 16, 1991. The average hatchling success and emergence percentages of the natural nests were 87.29% and 84.97%, respectively. The unshaded hatchery nests exhibited the lowest mean hatching and emergence success. Incubation periods were longest for the shaded nests. Most live hatchlings found in the nest cavities during excavation showed external deformities. The most common were carapace and plastron abnormalities, particularly scute variation that affected the majority of the nests. Scute variation was highest for the unshaded hatchery occurring in 28 nests (Palma, 1993).

9. Sex ratio of green turtle hatchlings in a simulated environment. One hundered nests were selected for histological examination and statistical analysis. Twenty sample nests were selected in the shaded portion of the hatchery and 80 nests were selected from the unshaded portion. Results revealed that the hatchling percentage in the shaded and unshaded areas were 81.16% and 85.19%, respectively. On the other hand, the emergence percentage of the shaded and unshaded portions were 81.61% and 79.94%, respectively. Male-female sex ratio in both shaded and unshaded areas was 1:9.2 (Palma, 1993).

10. Photopollution: Effects of light on nesting behavior of marine turtles (August 18-October 21, 1992). Four different colors (red, green, yellow and blue) were used to cover the source of light located in a specific area of the BIMTS Results of the study revealed that female turtles nested 12-25 m away from the source of light (Palma, 1993).

11. Habitat surveys. A total of 430 sites in 31 provinces have been surveyed. It has been observed that in most parts of the country, nestings occur occasionally because of degradation or development of nesting beaches. Illegal means of fishing and incidental catches decreased the turtle populations.