

Inventory, distribution, and conservation action
of the critically endangered Philippine forest turtle,
in Southern Palawan, Philippines



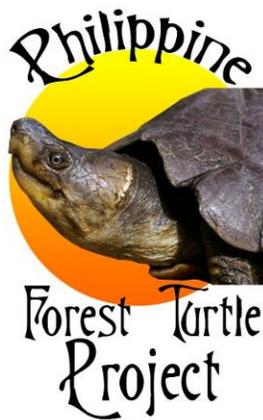
October 2009

Endangered Species International
Therefore I protect



REPORT

**Inventory, Distribution, and Conservation Action of the
Critically Endangered Philippine Forest Turtle
(*Siebenrockiella* = *Panayenemys leytensis*) in Southern
Palawan, Philippines**



By

Endangered Species International

In partnership with

Palawan State University

October 2009

TABLE OF CONTENT

1.0 EXECUTIVE SUMMARY	2
2.0 INTRODUCTION	3
2.1 ENVIRONMENTAL SETTING AND STUDY LOCATION	3
2.2. THE PHILIPPINE FOREST TURTLE (<i>SIEBENROCKIELLA = PANAYENEMYS LEYTENSIS</i>)	5
3.0 OBJECTIVES OF THE PROJECT	6
4.0 METHODS	6
4.1 TRAININGS	6
4.2 FIELD INTERVIEWS AND QUESTIONNAIRES	8
4.3 FIELD SURVEYS	9
5.0 RESULTS AND DISCUSSIONS.....	11
5.1 TRAININGS	11
5.2 FIELD RESEARCH	12
5.3 EVALUATION OF ANTHROPOGENIC THREATS.....	21
5.4 CONSERVATION AWARENESS	23
5.5 EVALUATION OF CONSERVATION MEASURES REQUIRED.....	23
6.0 QUALITY CONTROL	25
7.0 SAFETY	25
8.0 CONCLUSIONS AND RECOMMENDATIONS.....	25
9.0 LITERATURE CITED	28
10.0 BUDGET	30
11.0 ACKNOWLEDGMENTS.....	31

1.0 Executive Summary

The Philippine Forest Turtle (*Siebenrockiella* = *Panayenemys leytensis*) is one of the most endangered turtle species in the world which is endemic to Palawan, Philippines, specifically in the mainland of Palawan and Dumarán islands. Between 2007 and 2009, we conducted field interviews and surveys for the critically endangered Philippine Forest Turtle including other freshwater turtle species in southern Palawan to identify their distribution and status. In parallel, we evaluated their threats and appropriate conservation measures. We also conducted conservation educational and awareness activities and illegal trade surveys of the Philippine Forest Turtle.

According to the results of our field activities, we did not find the Philippine Forest Turtle in southern Palawan despite previous unconfirmed but plausible reports especially in the municipality of Rizal. Therefore, the Philippine Forest Turtle occurs presently in the northern part of Palawan in an area of roughly 39,000 km² and in Dumarán Island. The current range of this species is smaller than expected.

Three species of native freshwater turtles (*Dogania subplana*, *Cuora amboinensis*, *Cyclemys dentata*,) were encountered during our project. The Malayan Box Turtle (*Cuora amboinensis*) and the Asian Leaf Turtle (*Cyclemys dentata*) were commonly observed in the field. The Malayan Softshell Turtle (*Dogania subplana*) was found in more remote aquatic habitats at higher elevations of southern Palawan; however, it was abundant at some sites. The endangered Asian Giant Softshell Turtle (*Pelochelys cantorii*) was not observed in southern Palawan and Balabac Island despite the existence of a historical record in the latter island. Further, no suitable habitats were found in Balabac Island.

Persistent trade is one of the main threats to the survival of the Philippine Forest Turtle, and significant numbers had been recorded in trade in the Philippine's domestic markets, as well as being exported from the Philippines. The ongoing level of domestic and international trade highlights the failure of past and current activities to stop or reduce illegal trade, in particular at the domestic level. Over the last four years, we have continuously observed the Philippine Forest Turtle for sale in Manila and abroad.

Based upon the current and foreseeable threats, we believe that education, stopping local illegal trade through enforcement of existing laws, monitoring and research of existing populations, identification and enhancement of protected area, and providing sustainable alternative income for those who are illegally trapping turtles for the pet trade should be the conservation priorities for the years to come.

2.0 Introduction

2.1 Environmental Setting and Study Location

General Setting

Palawan is located between Mindoro and North Borneo Islands and is approximately 600 kilometers southwest of Manila, Philippines. It is the fifth-largest island in the Philippine archipelago, with an area of more than 11,000 square kilometers. The western side of the island is surrounded by the South China Sea, and the eastern side by the Sulu Sea (Figure 1). Islands belonging to the Palawan island group include Palawan-mainland, Busuanga, Culion, Linapacan, Cuyo, Dumarán, Cagayanés and Balabac.

The biological importance of Palawan is widely recognized both nationally and internationally. It is even identified by UNESCO as a Biosphere Reserve since 1990. The region includes several existing Proclaimed Conservation Areas such as Coron Islands (7,580 hectares), El Nido Marine Reserve (89,140 hectares), Malampaya Sound (90,000 hectares), and Puerto Princesa Subterranean River National Park. The entire province has also been declared a mangrove reserve.

Various types of forest formations ranging from mangrove to forests over ultramafic and limestone rocks, tropical lowland evergreen, moist deciduous and upper montane rain forests are found in the island. Palawan supports 11 amphibians (46%) which are endemic to the Philippines - eight of which are found only in Palawan. It is also home to 25 Philippine endemic birds (15%) in which 16 (62%) of them only occur in Palawan, 18 endemic mammals (33%) wherein 15 (83%) are endemic to Palawan, and 24 endemic reptiles (36%).

Palawan has about 422 terrestrial and known marine vertebrate species. This number accounts to about 39% of all the wildlife species found in the Philippines. Many of the species are endemic to Palawan and have restricted ranges confined in a small area (Diesmos et al. 2004b, PCSDS 2005). At least twenty-four faunal species are threatened which include nine birds, six mammals, five reptiles, and two amphibians (IUCN 2009). Many of the threatened species are endemic to Palawan (PCSDS 2005, IUCN 2009).

Study Location

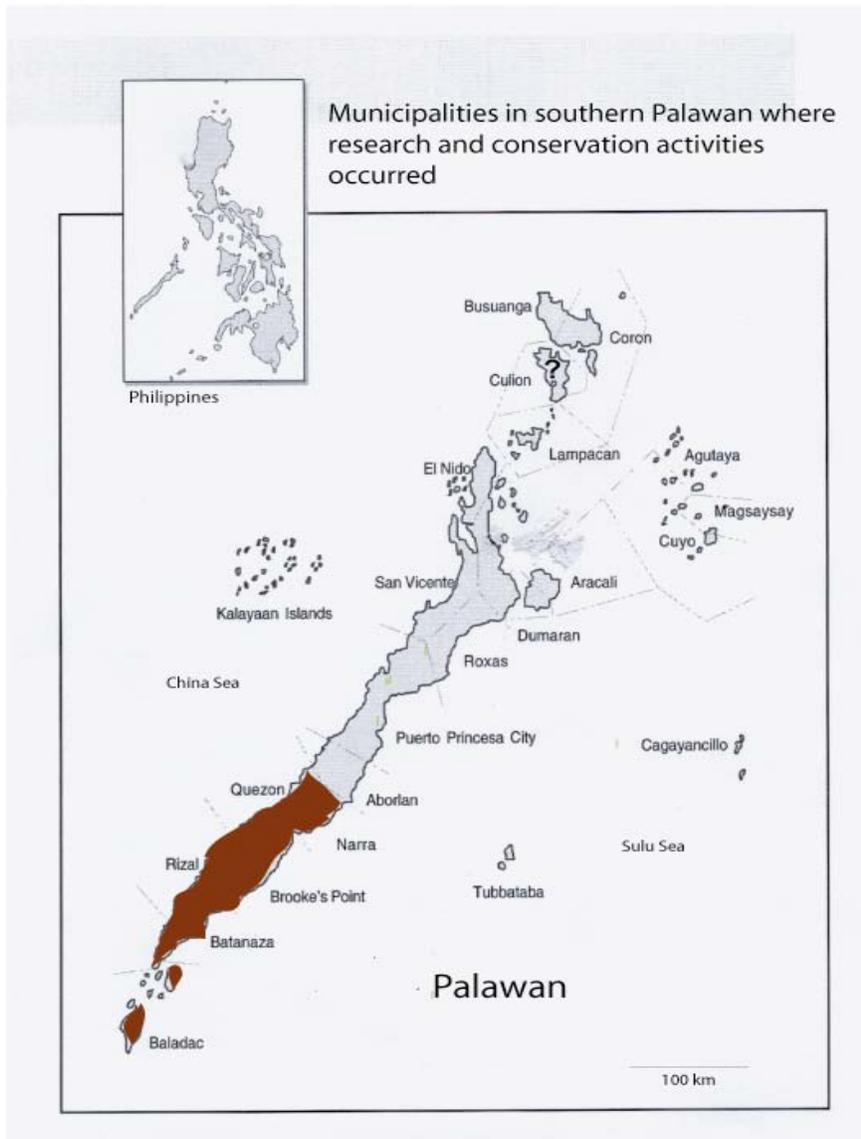
For this report we divided Palawan Island in two parts: the northern part including the municipalities of Aborlan, Puerto Princesa, Roxas, San Vicente, Dumarán, Taytay and El Nido; and the southern part comprising the municipalities of Narra, S. Española, Quezon, Brookes' Point, Bataraza, Rizal and Balabac.

Our project was undertaken in southern Palawan Island (Figure 1). The northern part was surveyed conjunctly by another project which is headed by Mr. Joie D. Matillano of the Western Philippine University (WPU). We also conducted interviews in early part of the project in Busuanga Island prior to WPU project activities. To avoid redundancy and increase of survey

effort among the two projects, we divided the study area into two parts: southern part for our project activities and northern part for WPU project activities.

Southern Palawan is an area where turtle surveys have never been conducted before and where the distribution of the Philippine Forest Turtle is unknown. To address the inadequacy of data, this project has been established in partnership with Palawan State University. Prior to our surveys, the Philippine Forest Turtle was already known at various locations in northern Palawan including in the municipalities of Puerto Princesa, Roxas, Taytay and Dumaran (Diesmos et al. 2004a, Fidenci 2004, PCSD personal communication 2005).

Figure 1. Study area.



2.2. The Philippine Forest Turtle (*Siebenrockiella* = *Panayenemys leytensis*)

The Philippine Forest Turtle is one of the most endangered turtle species in the world (Conservation International 2003; IUCN 2009) and the most endangered turtle of the Philippine (IUCN 2009). It is classified as critically endangered by the IUCN (IUCN 2009) and included in Appendix II of the CITES convention (CITES 2002).

First described in 1920 (Taylor), the Philippine Forest Turtle was thought to be extinct (Gaulke and Fritz 1998; Conservation International 2003) until live specimens were observed for the first in *situ* in 2001 and 2003 in northern Palawan, Philippines (Diesmos et al. 2004a; Fidenci 2004).

Prior to the start of our project, the Philippine Forest Turtle was known in the northern part of Palawan from the municipality of Puerto Princesa to El Nido in the north (Diesmos et al. 2004a, Fidenci 2004). However, its presence in the south has never been confirmed and remains a mystery despite few unverified reports. Our surveys and conservation activities occurred from the municipality of Narra (northern tip) to the municipalities of Rizal and Bataraza (southern tip) including Balabac Island.

Very little is known about the Philippine Forest Turtle's distribution, habitat type, biology, ecology, or status (Iverson 1992; Das 1996; Conservation International, 2003; Diesmos et al. 2004a; Fidenci 2004). Knowledge of this mysterious and endemic turtle relies on the description of four museum specimens (Taylor 1920 and 1944; Timmerman and Auth 1988), and the observation of few individuals in the wild and in captivity (Diesmos et al. 2004a; Fidenci 2004).

Distribution

The Philippine Forest Turtle is endemic to the mainland of Palawan, in Dumarán Island and in the northern parts of the Palawan Island Group, Philippines. Its current distribution is still ill-defined and needs further studies (Diesmos et al. 2008). It does not occur in Leyte which for 80 years was thought to be its type locality (Taylor, 1920). Prior to the start of our project, the Philippine Forest Turtles were observed in the northern part of the island including the municipalities of Puerto Princesa, Taytay, and Dumarán Island (Diesmos et al. 2004a, P. Fidenci 2004). Additional inventories were urgently needed to assess the distribution and number of population remaining in the entire Palawan Island Group especially in the southern part where no field surveys have ever been conducted in the past.

Habitat

Little is known about the habitat characteristics of the Philippine Forest Turtle. It has only been observed in slow-moving streams and marshes characterized by high turbidity with clay and silt substrate (Diesmos et al. 2004a, Fidenci 2004). It was also found in Lake Manguao in Taytay and surrounding creeks. Lake Manguao is the least disturbed lake in the Philippines surrounded by monsoonal forest. According to the local inhabitants, the Philippine Forest Turtle is found also in terrestrial habitat and uses burrows. This species has been found at elevations from near sea level to about 300 m (Diesmos et al. 2008).

Natural history

Diesmos et al. (2008) summarized data on natural history. However, little is known about this turtle. The Philippine Forest Turtle is nocturnal and semi aquatic. It has shown to be omnivorous in captivity. In the wild, it was observed feeding on freshwater fish, arthropods, algae, and fruits. Its diet includes probably other organisms abundant in its habitat such as annelids. Hatchlings have been observed during the dry season.

Threats

Illegal trade and habitat destruction pose significant threats to the survival of the Philippine Forest Turtle. It is only found in two islands, and currently, the known geographic distribution is limited. Therefore, the impact of illegal trade and habitat alteration could lead to extinction in the wild. Illegal collection for pet trade has been rampant in the last few years. It can be noted that, about 150 specimens from illegal trading were confiscated by local authorities in Palawan in 2004 (Personal communication, PCSD 2004). Habitat destruction includes illegal deforestation and aquatic habitat degradation (Quinnell and Balmford 1988).

3.0 Objectives of the Project

The objectives of the project were the following:

- To organize trainings which tasks include turtle survey techniques, conservation, and status of the Philippine Forest Turtle and its fragile habitat, as well as technical and scientific tasks including the use of the geographic information system. Training was conducted at Palawan State University and nearby field sites.
- To conduct a comprehensive assessment of the distribution and status of the Philippine Forest Turtle in southern Palawan where surveys have never been conducted before; in the mean time, a global assessment of all the freshwater turtle species was carried out.
- To conduct conservation awareness in Palawan.
- To propose and encourage long term conservation measures that will protect viable Philippine Forest Turtle populations within its entire range.
- To strengthen network between local and international individuals and institutions.

4.0 Methods

4.1 Trainings

Training is an important component of our project. It provided skills, knowledge, and technical experience in the area of turtle biology and conservation, field research techniques, Geographic Information System (GIS), which are all essential to conduct effectively the project. Three main trainings were undertaken prior to field project activities.

The first training was conducted at the main campus of Palawan State University, Puerto Princesa City, Palawan. It was held at the Audio Visual Room of the College of Sciences in November 2006. The lecture and presentation was presented by Pierre Fidenci.

Topics included are species account, distribution, survey techniques, status, threats and conservation of freshwater turtles of the Philippines. The information provided by the training are as follows:

1. Ecology of freshwater turtles;
2. Threats to freshwater turtles around the world: habitat alteration and destruction, human use of freshwater turtles, and disease;
3. Species account of freshwater turtles of the Philippines;
4. Species account and ecology of freshwater turtles of Palawan;
5. Status, threats, research and conservation of freshwater turtles in Palawan;
6. The Philippine Forest Turtle project: summary, goals, methodology, key project outputs, dissemination of results, project long-lasting impacts, and community involvement.

The second training (Photo 1) included field exercise on survey techniques for freshwater turtles, collecting data, and conducting effective interviews. Participants conducted and performed day and night field survey training in the City of Puerto Princesa, central Palawan. Field trainers included project team leader Pierre Fidenci and Palawan State University Professor Reymar R. Castillo. Series of training were undertaken from December 2006-February 2007 to enhance the knowledge and skills of the survey team members.

The third training (Photo 2) was conducted by Eng. Jose Don T. De Alban and was focused on Geographic Information System (GIS). The training was held at the main campus of Palawan State University between January 10 and 13, 2007. Selected faculty members and students as well as team members for the said project learned how to conduct a regional conservation assessment using GIS to determine critical conservation areas for an endangered species and to use landscape analysis to determine optimal landscape configurations for conserving endangered species.

The GIS training included the four following modules:

Module 1: Course Context

These sessions provide the opportunity for participants and the facilitator to level off their expectations of the course coverage, output, and the methodology to be used. The application of GIS in the context of conservation activities for the critically endangered Philippine Forest Turtle in Palawan is specifically addressed.

Module 2: Introduction to GIS

Through exercises and discussions, participants will have an understanding of concepts and elements of a GIS. Participants will discuss the underlying factors necessary to appreciate the concept of GIS and an overview of its elements, processes and application.

Module 3: GIS Processes

Participants are to be oriented on the details of the processes of a GIS: from data inputs, management, manipulation, analysis and outputs. With guidance from the training facilitator, participants will carry out exercises and practice skills applying the concepts.

Module 4: Course Assessment

Participants will take a practical examination to assess what they have learned during the GIS training. A course evaluation will also be accomplished by the participants to assess the whole training.

4. 2 Field interviews and questionnaires

A questionnaire form was designed and implemented. It was labeled as “Interview data form” which was focused on collecting information on existing habitat type (aquatic and upland habitat) of turtles, evidence of turtle species, breeding, and threat assessment. Respondents were asked a series of questions to help document turtle species prior in conducting any surveys.

The data collected during interviews included:

- Number of people interviewed, their social status, age, and location
- Names of nearest aquatic habitats, type of aquatic habitat including permanent or seasonal.
- Presence of turtles, turtle and species observed by locals: common, rare, or do not know.
- Visual characteristic of turtles observed.
- Philippine Forest Turtles observed and degree of certainty (high, medium, low, do not know).
- Any natural history observation.
- Turtle consumption and trade.

Field interviews were conducted by presenting to locals a series of clear photos of all four species known to be present in Palawan and the Asian Giant Softshell Turtle *Pelochelys cantorii* that is likely to occur in Palawan but no sighting has been confirmed. The four species include the Philippine Forest Turtle *Siebenrockiella leytensis*, the Malayan Softshell Turtle *Dogania subplana*, the Malayan Box Turtle *Cuora amboinensis*, and the Asian Leaf Turtle *Cyclemys dentata*.

Photos showed to locals represented clear characteristics of each species including their maximum dorsal length. In addition to photos, our team presented shells (carapaces) of dead turtles given by locals. The use of turtle shells increased considerably to the identification of turtle species by locals.

4.3 Field Surveys

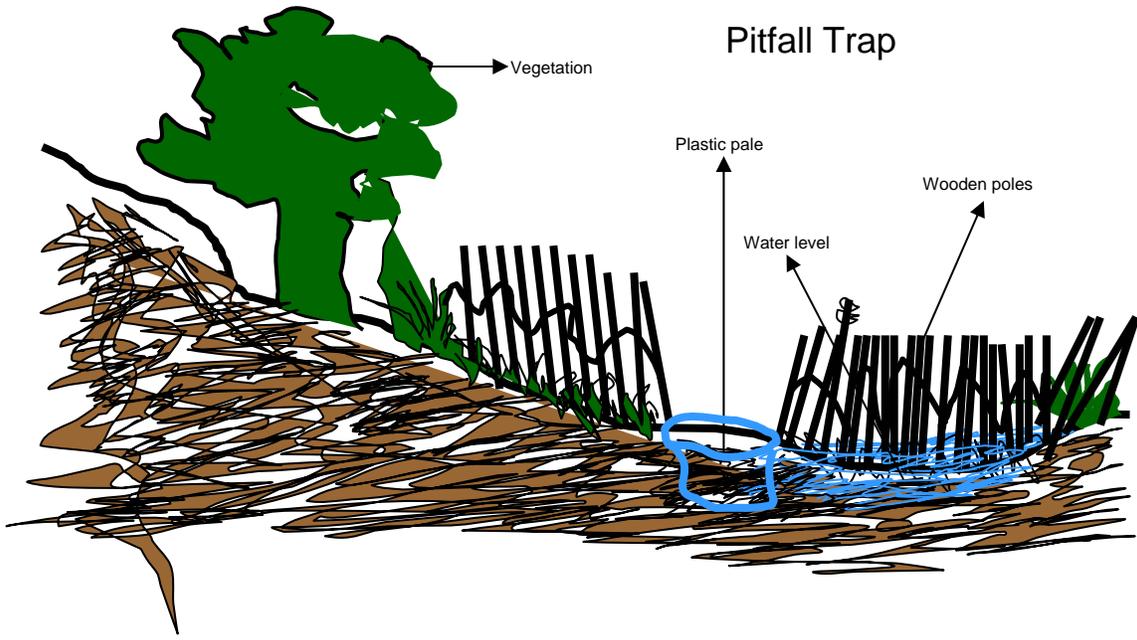
Comprehensive surveys were conducted in southern Palawan Island including, South Española, Narra, Quezon, Brooke's Point, Rizal, and Bataraza Municipalities, and Balabac Island where data on the Philippine Forest Turtle were very deficient.

Daytime surveys were conducted between 0730 and 1750 hrs, and nighttime surveys between 1800 and 2345 hrs. During daytime surveys, locals living near rivers, creeks, lakes, and ponds were interviewed (Photos 3 to 7). Representative photographs of freshwater turtles were used to help local inhabitants to identify turtles found in their environment. In addition, we produced and distributed more than 1,000 cards representing the Philippine Forest Turtle including contact information of our team in case the Philippine Forest Turtle would be observed later by locals (Photo 8). Previous studies (Berlin et al. 1966; Ives et al. 2008) and our experience have shown that local folk taxonomies must be interpreted with caution. Therefore, species identification and confirmation were established by the data collection of voucher photographs collected by our team.

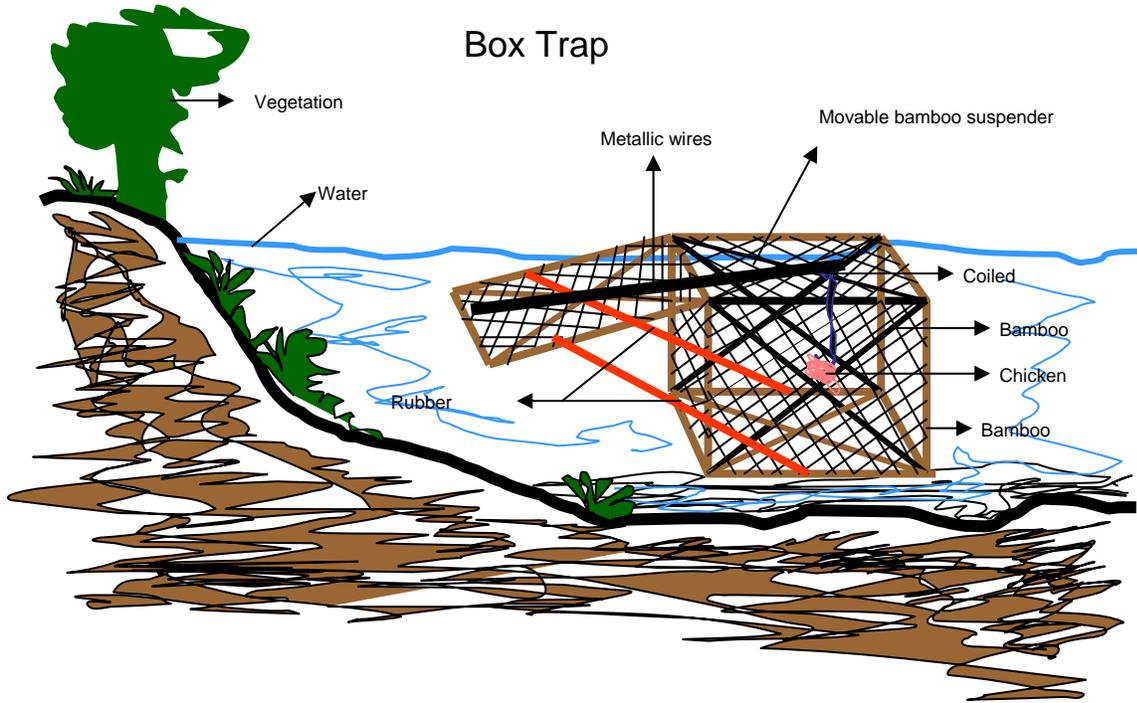
The techniques for turtle surveys included visual surveys, snorkeling, and trapping. Surveying was done along suitable aquatic and upland habitats (Photos 9 to 10), up to 100 meters above sea level. Snorkeling was used to detect turtle species in deeper waters, under rocks, or under the undercut of banks. Trapping was used in conjunction with other techniques. We used pitfall traps, box traps, baited wires (Fidenci 2005b), and net traps. Box traps varied in size, with the smallest measuring 0.7 meter in length and 0.5 meter in width and height, and the largest 2 meters in length and 1 meter in width and height. Various baits (e.g., fish, crabs, and fruits) were employed to attract turtles. Baited wires were placed in shallow water, usually less than 0.5 meters from the shoreline, to attract turtles. Selected trapping techniques were identified based on experiences by the survey team and during the conduct of monitoring by Mr. Reymar R. Castillo and Elmer G. Gadot.

The three trapping techniques used during our surveys are described below:

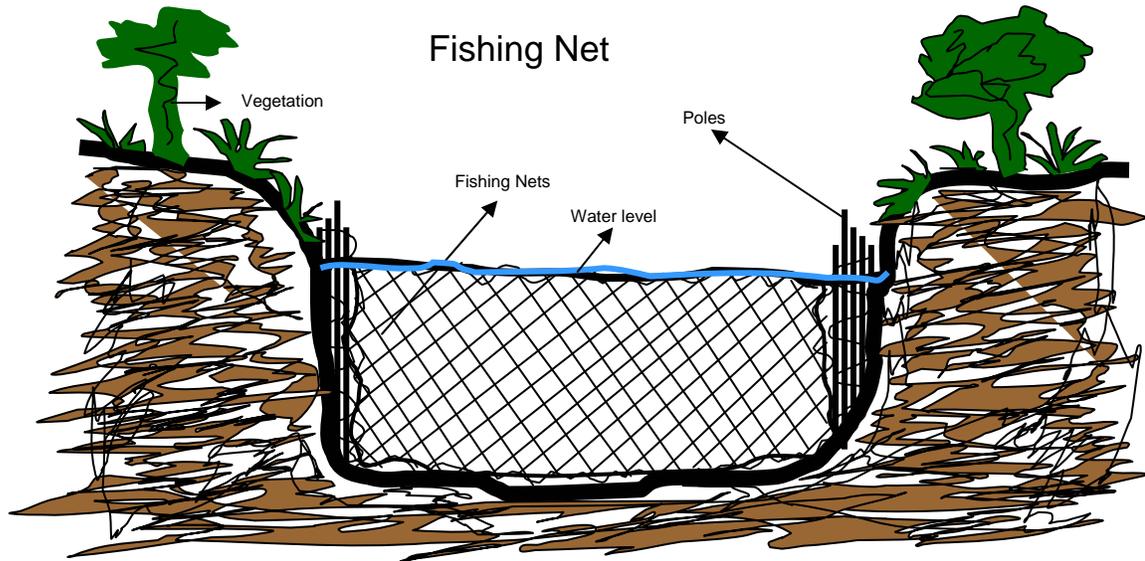
1. Pitfall traps were used in areas drained by shallow water. They were built using local materials including bamboo. Pitfall traps were used only in the municipality of Bataraza where locals confirmed the presence of the Philippine Forest Turtle.



- Box traps were used in an area with stagnant water such as swamps, marshes, or in deep pools of creeks with low flow velocity. They were built mostly of local materials including bamboo. Box traps were the main technique used for capturing turtles.



3. Net traps were used continuously in flowing streams.



Captured turtles were measured (plastron and carapace length), marked, photographed, and immediately released. Baits were checked every 30 minutes, from a distance, with binoculars (at least 10 meters). Trapping sessions occurred during daytime and nighttime.

During surveys, the following data were recorded: date and duration of surveys, air and water temperatures, wind velocity, weather condition, size of area surveyed, average and maximum depth, water velocity, percentage emergent and floating vegetation, canopy cover, substrate type, turtle species observed, activity of turtles observed, number and size of turtles captured, upland habitat description, land use type, human impact(s), if any. Locations of turtles were recorded using GPS. All data were recorded on the prepared survey form.

To reduce the risk of spread of disease agents and parasites that could affect amphibians between study sites, we followed the Code of Practice prepared by the Declining Amphibian Populations Task Force (DAPTF 1998). After surveying each site, field equipment (*e.g.*, boots, nets) was rinsed with sterilized water (*e.g.*, boiled or treated) and then scrubbed and rinsed clean with clean water.

5.0 Results and Discussions

5.1 Trainings

Three trainings (freshwater turtles of the Philippines, field techniques for surveying freshwater turtles and interviews, and Geographic Information System GIS) were conducted at Palawan

State University and nearby field sites. They were attended by various students and faculty members. We extended the number of participants to other students to increase awareness in wildlife conservation.

Overall, trainings were well-received as evident in the high number of participants. However, for the GIS training, we had to limit the attendance to those who are participating in the Philippine Forest Turtle project or similar study due to the limited number of available computers. All participants belonging to our team passed the final examination of the GIS training. Upon completion, participants received a GIS certificate.

On January 17, 2007, our team members completed all necessary trainings. Project members then departed to Southern Palawan to apply what they have learned, and to start the project activities on the critically endangered Philippine Forest Turtle.

5.2 Field Research

The survey activities focused on Southern Palawan, including Balabac Island where no turtle surveys have ever been conducted in the past. Subject municipalities of Palawan included Narra, S. Española, Brooke's Point, Quezon, Bataraza, Rizal and Balabac Island. Distribution of freshwater turtle species, limitations and constraints of the study were discussed in this section.

5.2.1 Southern Palawan Island

Narra

In the Municipality of Narra, interviews and surveys were conducted at various locations between January and April 2007. In the area of Aramaywan, interviews were done at villages situated near the Calategas, Patilig and Katarigan Rivers, Salonggigi, Pangihidyuan, Inarayan, Surop and Dakutan Creek. Thirty-three people aging from 15-70 years old were interviewed. The respondents included farmers, fishermen, hunters, teachers, Barangay officials, tribal chieftains, tribe elders, young people, family heads, and house wives. A third of them reported to have seen *S. leytensis*.

Field surveys were undertaken in areas where locals have reported the potential presence of *S. leytensis*. Four rivers and three creeks were assessed. Repeated night time surveys did not detect the presence of *S. leytensis* in Narra despite few positive answers from some locals. Creeks had a substrate ranging from gravel to sand. In general, they were medium-sized permanent creek with pools and riffles. Pools were medium sized and lacked emergent vegetation along the shoreline.

Sofronio Española

Interviews and surveys in the Municipality of S. Española were conducted during February and March 2007 in the following barangays:

Panitian- 101 respondents living in communities/sitios near Alipid Creek, Panitian River, Binagoyuhan Stream, Malinao Stream and Indigenous People community at Sitio Bidang were interviewed.

Labog- 32 respondents were interviewed at Sitio Naltep, Lunawan Creek, Tagararan Creek, Barasian Creek, Sisugod Creek and Labog River.

Punang- 35 respondents settling near Baluguan Creek, Kortang Creek, and Tagusao River. Indigenous people communities include Sitio Pansur and Sitio Singkab was interviewed.

Pulot Interior- 41 respondents were interviewed from Olympic area, Sitio Pasi, and Sitio Isumbo. Indigenous people communities were settling along Pasi River, Tagusao River and Isumbo River.

Pulot Center- 6 respondents were interviewed from communities living along Malalong River, Barangay officials and students.

Pulot Shore- 33 respondents were interviewed who were mostly Muslims. Some were farmers, fishermen and few indigenous peoples.

The total number of respondents in S. Española was 248 persons with an age group between 10 to 60 years old. Majority of them were indigenous people, others were farmers, fishermen, hunters and students. Only indigenous people at Pulot Creek responded with a medium certainty of seeing a turtle with yellowish line around neck, probably *S. leytensis*, about three years ago.

Surveys for turtles were conducted at various creeks. Examples of survey sites included Alipid Creek (1.4 km upstream) and Malinao Creek (1.7 km downstream) at Barangays Panitian, Labog Creek from Tagararan Creek up to the head water of Isugod Creek (12km upstream), Baluguan Creek down to Tagusao River at Sitio Singkab (within the jurisdiction of Bgy. Punang), 8 km downstream. Pasi river of Pulot Interior was surveyed down to the intersection of Tagusao River and Pulot River (2 km downstream). No *S. leytensis* were found during all surveys. However, *C. amboinensis* and *C. dentata* were encountered. Both species were common in S. Española.

Brooke's Point

Interviews and surveys in the Municipality of Brooke's Point were conducted between March 2007 and March 2008. The total number of respondents in the Municipality of Brooke's Point was 512 persons with an age ranges from between 10 to 60 years old. The majority of them were coconut farmers and indigenous people, other respondents were fishermen, hunters and students. Based on most interviews from the indigenous peoples who provided the most useful information, two species of hard-shell turtles are found in Brooke's Point: "Kirum" is the Palaw'an term for *C. amboinensis* and "Bayó" for *C. dentata*. However, some indigenous people indicated that *S. leytensis* may occur in the municipality. Some claimed to have seen *S. leytensis*

three years ago. When questioned about specific characteristics of *S. leytensis*, their responses were usually vague. In general, our respondents have not seen any large turtle as the specimens' carapace (*S. leytensis* adult > 25 cm) that we showed them.

One respondent from Sitio Linao, Ipilan confirmed his participation on turtle trade (probably *S. leytensis*) in Balabac Island. He claimed of having 20 specimens from Kanduli River ready for shipment to Malaysia but it was sabotage by the buyers. Specimens were shipped to Malaysia without their consent. Turtle trade at Brooke's Point exists according to one indigenous people. He stated that he had a transaction of selling four *C. amboinensis* at Php 400 (9 USD) each to Mr. Sanchez at Bgy. Ipilan. According to him, Mr. Sanchez had contacts at Switzerland where turtles were being shipped.

We focused some of our field surveys on the northern part of Brooke's Point where forest cover remains including at mountain ranges. Deforested areas up to 500 m elevation were observed from Barangay Malis to Aribungos. Surveys at Barangays Maasin were conducted at Mararag Creek (1 km upstream) and a rapid assessment was done also at Malalong River from Sitio Mararag up to Sitio Giyob (2.5 km upstream). Kalagasan Creek at Barangay Mambaot was surveyed covering a length of 7.3 km upstream. Surveys were conducted at Barangay Ipilan: Linao River (600 m upstream) and Lapiac Creek (700 m upstream).

Pange Creek at Sitio Baribi, Aribungos was also surveyed (3.5 km downstream) including Candis Creek which intercepts Pange Creek. Three creeks were surveyed at Sitio Mangkongon, Amas: Patgas Creek (400 m downstream), Bubulusan Creek (350 m upstream), and Mangkongon Stream (2 km downstream).

Overall, we did not observed *S. leytensis* during surveys. However, *C. dentata*, *C. amboinensis*, and *D. subplana* were encountered mostly at night.

Quezon

Interviews and surveys in the municipality of Quezon were conducted between January 2007 and April 2008. The total number of respondents in the said municipality was 312 persons with an age bracket between 8 to 65 years old. Majority of them were rice farmers, coconut farmers and indigenous people. Other respondents were teachers, fishermen, hunters, driver operators, and students. According to the results of the interviews, *C. amboinensis* and *C. dentata* were common in all barangays, which was confirmed later by our surveys. The likely presence of *S. leytensis* appeared to be low since most of locals were not aware of this turtle species.

At Barangay Tabon, 51 respondents were interviewed and most of them were indigenous people. Tabon proper were also included and farmers were also interviewed. At Barangay Tumarbong, 13 people living in the area Tumarbong Bridge and upstream were interviewed. At Barangay Maasin, 18 individuals were interviewed, most of the respondents were indigenous people found in Marintub. In the northern part of Barangay Tabon, we encountered a family who claimed to know a man who used to trade freshwater turtles; however, they could not identify the species involved in the trading. Further, we could not locate the man who traded turtles in the past.

Field surveys were conducted at various sites where suitable aquatic habitats for turtles were identified. Examples of survey sites included Mama-an Creek in Barangay Tagbae which was assessed over a distance of 4 km from downstream. This creek has a width of 1-5 m, depth of 0.1-1.75 m, slow water flow, medium turbidity, silt and sand as substrate. Terrestrial habitat bordering the creek is mostly deforested and is covered by coconut plantations and patches of agriculture fields. The creek has various invertebrates and vertebrates including aquatic insects, univalves, crayfishes, frogs and water monitors. Indigenous people indicated that they encountered *S. leytensis* for the last time about five years ago and they seldom found turtles in the area. Another survey site included Tagbae Creek. This creek is surrounded by coconut plantations and patches of deforested hills in both sides. The creek is seasonal with medium turbidity, slow water flow, 0.5-2 m wide and 0.1- 0.3 m deep. Indigenous people observed large turtles (> 25 cm) for the last time about five years ago but remained very vague on the description of the species. Local residents used to capture freshwater turtles for food.

At Barangay Tabon, we also surveyed Sabsaban Creek from the starting point known as Maguraman-guraman and the end point known as Pasi. We have known earlier that captured turtles *C. dentata* and *C. amboinensis* in Sabsaban Creek were placed in an artificial pond in the town of Quezon, which we visited and photo-documented prior to the field survey. The creek is 1-5 m wide and 0.2-1.5 m deep. Under water refuges included bank crevices, under root channels and wood debris. Only few big trees were observed with the dominance of shrubs and small trees 10 m away from the bank. Farther, coconut plantations were observed at both sides of the creek. During surveys, we observed *C. dentata* and no *S. leytensis*. Local perceptions of abundance and species identification collectively indicate that *C. dentata* and *C. amboinensis* are commonly found in Sabsaban Creek.

In Barangay Quinlogan, we surveyed Tagbuaya River. Locals pointed to that site as suitable habitat for turtles. It is seasonal river covering both municipalities Quezon and Rizal. During surveys, turbidity was clear, water velocity was high, and water depth ranged from 0.5-1.5 m. Mostly grasses and shrubs were observed along the river and the primary forests which were seldom seen were 300-400 m away from the river. Kaingin areas were considerably large and consistent as we crossed the hills way to the end point, which had an elevation above 200 m. We surveyed the river downstream and dismayed by the substrates which were gravels and rocks. Interviews to the natives living near the area revealed that they only encountered *C. dentata* and *D. supлана* as confirmed by our survey results.

Overall, during our surveys, we observed *D. supлана* at various upland creeks where in part it was previously found (Fidenci 2005a). Habitats of *D. supлана* included forested streams at higher elevations usually in remote areas. Streams are usually shallow and are composed of gravels and cobbles. Indigenous people catch softshell turtles incidentally for food and sometimes keep juveniles or young adults as pets in small jars with water as observed in several occasions.

Bataraza

Interviews and surveys occurred in April, June, and July 2007. In general, interviews turned out negative from the respondents. The respondents were usually hunters, farmers and laborers. Field surveys revealed the presence of three turtle species: *C. dentata*, *C. amboinensis* and *D. subplana*.

No surveys (only interviews) were conducted in Rio tuba because it is covered by two large mining companies. Together with the negative results gathered from the respondents and ocular inspection of the area, we believed that there was a poor probability on the presence of *S. leytensis*.

At Sumbiling, all interviews yielded negative responses for *S. leytensis*, however, *C. dentata*, *C. amboinensis*, and *D. subplana* was often cited as species found in Sumbiling. Furthermore, the respondents who were mostly native hunters claimed that they do not recognize the pictures of *S. leytensis* presented to them. A total of six creeks were surveyed in this barangay. All were done during the nighttime and one from midnight to dawn. The surveys yielded negative results for *S. leytensis*.

We interviewed a total of 33 people in Sitio Tagmaya, part of Barangay Sapa. The respondents were composed mostly of native Muslims and the Palawa'n indigenous people. During interviews, the respondents were able to differentiate *C. dentata*, *C. amboinensis*, and *D. subplana* from the pictures that were displayed to them. However, they never observed *S. leytensis* in the area and we did not find them during surveys.

In Malitub, a total of 14 respondents were interviewed. None of them knew about *S. leytensis*. Similar to other interviews, only *C. amboinensis* and *C. dentata* are common in that particular area. One respondent stated that he saw a *C. dentata* feeding on the seeds falling from a tree commonly known to the Palaw'an as "Ablas". The Filipino term for that tree is "Mulawin".

Barangays Tagnatu, Puring and Buliluyan are mostly covered by vast coconut plantations and rice paddies. Rampant logging activities can be seen to be operating even in broad daylight. The likelihood of finding *S. leytensis* in these barangays was very poor. The interviews and surveys yielded negative results on the presence of *S. leytensis*.

Rizal

Interviews and surveys in the Municipality of Rizal were conducted between March 2007 and January 2008. We interviewed 296 people in the municipality of Rizal with an age group of 12 to 70 years old. They included farmers, fishermen, indigenous people, school children, and government officials. Most of them lived along creeks or ponds. Some respondents confirmed to have seen a turtle looking like a *S. leytensis* based on photos, descriptions, and turtle's shells shown to them.

Rizal was an important municipality for our surveys since we had positive interviews stating the existence of *S. leytensis*. One of our guides named "Manong Entol" and warden of Katala Foundation Inc. proclaimed to have caught a *S. leytensis* in Baranagay Culasian. He also showed

us a picture documented by the Katala Foundation Inc. when they established an inventory of fauna in a protected area of Culasian. Manong Entol stated that he observed *S. leytensis* when the creek was almost dry. Our team conducted multiple survey visits in the same creek, but we did not find any *S. leytensis*. Instead, we encountered the *C. dentata*. After completing all surveys, the question remained unclear on whether Manong Entol really observed the Philippine Forest Turtle or if he misidentified what he saw with a *C. dentata*. We could not either get clear information from the Katala Foundation Inc. regarding the origin of the photo since we had conflicting answers. Based on our survey results, we could not confirm the presence of the Philippine Forest Turtle.

Overall, field surveys revealed the presence of the *C. amboinensis*, *C. dentata*, and *D. subplana*. *C. amboinensis*, *C. dentata* were observed in rice paddies and creeks within undisturbed and disturbed habitats. *D. subplana* was observed in clean, rocky, shallow, fast-running upland creeks. We found this species at night hiding beneath rocks and large stones in the stream bed, its flexible, flattened shell allowing it to do so. Hatchlings (2-3 weeks old) and juveniles of the *D. subplana* were observed between November and January.

5.2.2 Balabac Island

Balabac Island is located in the extreme southwestern Philippines, about 35 km south of Palawan Island, and about 70 km north of Borneo. Despite its size (36 km long and 12 km wide), Balabac has a rich biodiversity with various types of natural habitats ranging from primary and secondary rainforest with elevation up to 580 meters mangroves, and coral reefs. The island is home of an endemic and endangered wildlife such as the Philippine Mouse Deer (*Tragulus napu nigricans*), the world's smallest ungulate. Beside its remoteness, safety remained the main reason probably why most scientists rarely ventured in the island. Dirt roads are rare and most of the exploration is on foot through trails.

Two main expeditions were conducted in Balabac. The first expedition included the Barangays of Indalawan, Malaking Ilog, Salang, Agutayan, Rabor, Pasig and Melville. The second expeditions included Pasig and Melville. Interviews and surveys for turtles were conducted during February and March 2007.

We interviewed 325 people in Balabac with an age ranging from 20 to 85 years old. Majority of them were from the Molbog indigenous tribe, other respondents were farmers, fishermen, hunters, officials, and students. We explored the entire island except the north east where it was unsafe to adventure even for locals. Based upon interviews and habitat assessment, the most suitable areas where the Philippine Forest Turtle can be found include the central and south parts of the island.

A total of ten people affirmed positively to have encountered *S. leytensis*. Five of them reside in Indalawan, one in Salang, and four in Pasig. The respondents said that they had observed *S. leytensis* walking through rice paddies, under fallen leaves, on river banks, creeks and muddy places where turtles tend to spend time lurking in the mud during dry seasons.

Based on habitat features and interview results, among the seven barangays found in the island, only Indalawan, Salang and Pasig were the most likely to harbor *S. leytensis*. Intensive night surveys were then conducted at various locations of the island where locals confirmed the presence *S. leytensis*.

Despite prolonged effort, the positive responses from few locals, and the presence of potential aquatic and upland habitats, we did not detect the Philippine Forest Turtle in Balabac Island. We encountered numerous *C. dentata* and *C. amboinensis* both adults and juveniles. The past unverified “reports” of probable occurrence of the Asian Giant Softshell Turtle (*Pelochelys cantorii*) was negative. The absence of the *P. cantorii* is probably not that surprising since large water systems are practically non-existent in Balabac. We did not encounter the *Dogania subplana* despite the presence of few suitable forested creeks. As far as the Philippine Forest Turtle, our searches were also negative.

5.2.3 Distribution of Freshwater Turtle Species in Palawan

Below we provide an overview on the inventory and distribution of the freshwater turtle species found in the Palawan island group.

Four species (Photos 11-14) of native freshwater turtles (*Dogania subplana*, *Cuora amboinensis*, *Cyclemys dentata*, and *Siebenrockiella leytensis*) are known to occur in the Palawan Island Group (Diesmos et al. 2008 and Fidenci 2005). The Palawan Island Group includes the islands of Busuanga, Culion, Dumarán, Palawan, Balabac, and other smaller islands.

We observed the Malayan Softshell Turtle (*Dogania subplana*) in southern Palawan in the municipalities of Rizal, Quezon, S. Española, Bataraza, and Brookes’ Point (Figure 2). The species is only found in southern Palawan (Diesmos et al. 2008 and this report). We did not find the Malayan Softshell Turtle in Balabac and it appears to be absent there.

The Malayan Box Turtle (*Cuora amboinensis*) occupies most of Palawan with a wide range including smaller satellite islands (Figure 4). We observed this species in numerous occasions during our surveys and it is a common species in the Palawan Island Group including southern Palawan. The Malayan Box Turtle is found in Palawan, Culion, Batas (Fidenci Herpetological Review in press), Dumarán, and Balabac. *C. amboinensis* is habitat generalist in Palawan, occurring in a variety aquatic habitats including urban areas such as Puerto Princesa City where we observed this species despite its cryptic behavior.

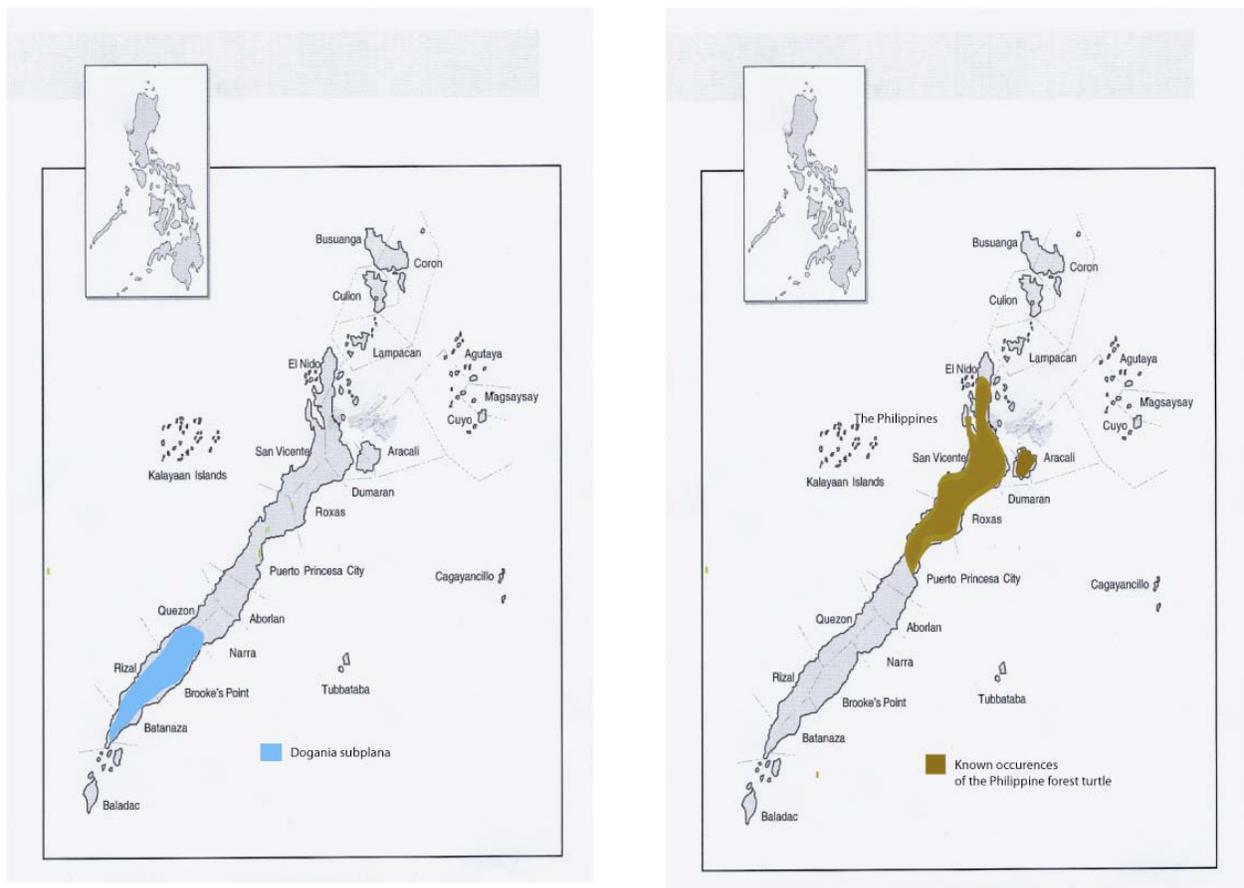
The Asian Leaf Turtle (*Cyclemys dentata*) is also a very common species in the Palawan Island Group (Figure 5). It is a widespread and occurs in Palawan, Culion, Busuanga, Dumarán, and Balabac (Diesmos et al. 2008 and this report). We observed this species in streams and on few occasions on land.

The Philippine Forest Turtle is endemic to Palawan and Dumarán. In Palawan, this species has been found only in the northern part of Palawan (Taytay, San Vicente, Roxas, and Puerto Princesa). This species was believed to have maybe a wider distribution within Palawan

including other satellite island like Busuanga or Balabac. However, our surveys confirm that the Philippine Forest Turtle is currently absent in Balabac and southern Palawan.

The Asian Giant Softshell Turtle (*Pelochelys cantorii*) is found in two islands in the Philippines including Luzon and Mindanao (Diesmos et al. 2008). We believe that this species is absent in Palawan including Balabac where it was cited a long time ago (de Elera 1895; Siebenrock 1903). All our interviews and surveys did not locate the Asian Giant Softshell Turtle in Balabac and southern Palawan. *Cuora amboinensis* and *Cyclemys dentata* were the only two freshwater turtles found in Balabac. Both species were common and rarely consumed by locals. Further, the lack of suitable habitats (large water bodies) throughout the island of Balabac indicates that *Pelochelys cantorii* may have never occurred there as previously believed.

Figures 2 and 3: Distribution of *Dogania subplana* (blue color) and *Panayenemys* = *Siebenrockiella leytensis* (chestnut color) in the Palawan Island Group.



Figures 4 and 5: Distribution of *Cuora amboinensis* (green color) and *Cyclemys dentata* (orange color) in the Palawan Island Group.



5.2.4 Limitations and Constraints

During interviews, the most important data collected from the questionnaires pertained to the Philippine Forest Turtle presence, habitat association and threats assessment. These variables helped us to delineate and determine classification and prioritization. However, we believe that we did not capture all available data.

Data constraints depend on the questionnaire data quality and the people interviewed. Keeping questions open ended, asking about information on turtles based upon different criteria and representative photos helped to some extent determine the credibility or weight of responses. Experience with interviews-based assessments of freshwater turtles indicates that without a very rigorous interview protocol, it is difficult to gain reliable data on species (Kuchling et al. 2006). Exaggerations or miss-conceptions of turtle species by locals can be common as we experienced throughout our interviews.

Our experience throughout southern Palawan indicated that many answers were erroneous after we conducted multiple field surveys in areas where some locals identified a site having *S. leytensis*. Even locals who confirmed to have seen *S. leytensis* were not able to produce a turtle on demand, and after a while stories changed and they claimed it would take several weeks to find one *S. leytensis*. The use of carapaces of turtles for species identification appeared to provide stronger answers than the photos alone.

Data sharing, especially on a scale of Palawan, comes with many issues. Researchers and scientists, either individuals or those working for organizations and governments, have put some effort and resources into collecting their own data information that will aid in freshwater turtle conservation efforts, but also reports that they hope to publish. Pooling such data into a larger, collective process goes against what some scientists have spent time doing. We tried to counteract any feelings of mistrust or fear from the beginning by sharing our clear objectives, our methods along the way to other institutions. However, we encountered mistrust and jealousies from few individuals that did not want to share their data for better conservation.

This effort, imperfect as it may be in some respects, provides the first effort to collect comprehensive information on the Philippine Forest Turtle conservation across Palawan. It provides a baseline for comparison to future efforts.

5.3 Evaluation of Anthropogenic Threats

We evaluated the anthropogenic threats for all the entire known range of the Philippine Forest Turtle. We conducted site visits at various locations, evaluated known data on trade, and identified current threats. We rated each factor from 0 (not a factor) to 3 (high factor) that likely contribute to the decline of the Philippine Forest Turtle (Table 1).

5.3.1 Trading

Overall, illegal collecting of the Philippine Forest Turtle is the highest factor contributing to the decline of the Philippine Forest Turtle (Table 1). Past reports have shown the negative impacts of illegal trading on the Philippine Forest Turtle in the areas of Taytay and San Vicente in northern Palawan (Diesmos and Palomar 2004b). In Taytay, a major trading area, turtles are now more difficult to observe in the wild and some populations are thought to have been reduced dramatically or extirpated. *S. leytensis* has been sold illegally for domestic and international trade for the last eight years; therefore, the impact on wild populations is obviously very detrimental to the species. Domestic and international trade is still vivid and the Philippine Forest Turtle is being illegally sold in the Philippines, North America, Europe, and Japan (Diesmos et al. 2008 and Fidenci and Maran 2009).

During our field surveys, we obtained few reports of turtle trading in southern Palawan, however, our data revealed that the source of Philippine Forest Turtle trading originated from northern

Palawan especially Taytay. For example, in S. Española, two carapaces of the Philippine Forest Turtle displayed in a house came from Taytay. Freshwater turtle traded in southern Palawan included all the four species occurring in the region. We could not obtain any volumes on the trade, but as mentioned early in the report, the Malaysian Box Turtle and the Asia Leaf Turtle were abundant in the field, and the Malaysian Softshell Turtle can be abundant at some sites, thus, the impact of the trade appears to be small on those species at the present time.

One respondent from Balabac Island revealed us the presence of a trade of freshwater turtles from Balabac Island to Malaysia. However, the size of the trade is unknown including whether it is occasional or regular. Once in Balabac Island, we had also a similar report of turtle trade including other wildlife to Borneo (Malaysia) but very little information could be obtained. This would be the first mention of existence of turtle trade from Balabac to Borneo.

In Manila, Philippine Forest Turtle is not displayed to the public in pet trade stores since 2005, however, trade still occurs (Photo 15). As opposed to the findings of Matillano (2008), we continuously observed *S. leytensis* in all major pet markets in Manila (e.g., Cartimar) including the main Chinese market, demonstrating that domestic illegal pet trade is still rampant. We observed between two and ten *S. leytensis* for sale at each market, observing 171 animals over the 4-year period (Fidenci and Maran 2009). Turtles were hidden in the back of stores and brought to potential buyers only when it was felt that there were no risks involved. Sellers called the species “Palawan turtle” or simply “leytensis”. During our last 2009 surveys, the species was sold for between 2,500 and 3,500 pesos (53 and 75 USD) per turtle, but could be negotiated down to 1,200 pesos (28 USD) for smaller individuals. In general, turtles were cheaper at the Chinese market. This was a 4- to 6-fold price increase since 2005. Our undercover monitoring methods revealed that turtles could be ordered within one or two weeks but that large-sized turtles were difficult to obtain. Most of the turtles sold for the domestic pet trade were sub-adults and young adults. It was rather uncommon to find large individuals (greater than 30 cm in carapace length) for sale.

5.3.2 Land Use

Land use can be detrimental to the aquatic and upland habitats of the Philippine Forest Turtle. Construction of roads, alteration of creek’s banks, deforestation, and water pollution are potential threats to the Philippine Forest Turtle. However, habitat destruction and degradation is a lower factor than illegal trading affecting the Philippine Forest Turtle (Table 1). Some creeks and upland habitat occupied by turtles are within protected areas (e.g., Puerto Princesa Subterranean River Natural Park). However, a large portion of known occupied sites are threatened by deforestation, alteration of creeks, and other human activities.

Table 1. Anthropogenic factors affecting the Philippine forest within its known range in Palawan and Dumaran Islands.

Factor	Overall rating*	Palawan	Dumaran
Collecting/harvesting	2-3	3	1
Land use			
Habitat destruction	1	1	1
Habitat fragmentation	2	1-2	2
Habitat degradation	2	1-2	2
Exotic Species	0	0	0
Water contamination	1	1	1

Note: Overall rating includes both Palawan and Dumaran Island, the only two islands where the Philippine Forest Turtle is known to occur.*

0: not a factor; 1: low factor; 2: medium factor; 3: high factor

5.4 Conservation Awareness

Conservation awareness on endangered freshwater turtles has increased in Palawan over the last three years; however, overall it remains low. Increasing conservation awareness at the local level is an important part to maintain viable wild populations of the Philippine Forest Turtle.

During our conservation activities, we reached an audience of about 5,000 to 6,000 people (Photos 16-18). We conducted conservation outreach at several schools including about 150 students from elementary and secondary schools (Photo 19). Topics included natural history of freshwater turtles of the Philippines and conservation needed. Overall, local communities showed a great interest and willingness to support our conservation education activities.

We invited indigenous and local people to join us in our field surveys as part of awareness activities. Posters and calendars highlighting the rarity, legal status, illegal trading, and conservation needs were distributed where the Philippine forest was believed to be present based on interviews with locals. Puzzles on the natural history, threats, and conservation were created and distributed at schools and villages (Photo 20).

5.5 Evaluation of Conservation Measures Required

The causative factors in the decline of the Philippine Forest Turtles are known (Table 1) and effective active conservation is urgently needed. Based on the distribution, threats, and current projects on the Philippine Forest Turtle, we have ranked conservation measure effectiveness that should be implemented over the years to come to ensure that viable populations remain in Palawan and Dumaran islands (Table 2).

Based upon the current and foreseeable threats (see section 5.3 Evaluation of Anthropogenic Threats), we believe that education, stopping local illegal trade through enforcement of existing laws, monitoring and research of existing populations, identification and enhancement of protected area, and providing sustainable alternative income for those catching illegally turtles for the pet trade should be the conservation priorities for the years to come (Table 2). On the opposite, captive breeding facility and reintroduction of Philippine Forest Turtle in the wild is the least effective conservation measure at the present time. The roots of the problem (illegal trade and habitat destruction and degradation) must be addressed aggressively as a priority to preserve wild populations.

During our interviews in Palawan, we clearly noticed the lack of awareness about illegal trading of endangered species and conservation including the Philippine Forest Turtle. The lack of awareness was also evident in Dumarán Island where we observed in 2008 the destruction of a section of Omoi Creek by local residents despite the presence of Katala Foundation Inc., a local NGO. The said area is considered as one of the habitat of Philippine Forest Turtle.

Matillano (2008) recommends release of *S. leytensis* at suitable sites. We strongly believe that release of individuals should be the last resort (Table 1) and current data does not support such conservation activity. Releasing turtles in the wild can be rather a complex task and require comprehensive data on the turtle’s natural history and its habitat. Further, releasing turtles should be one of the last resort actions. Conservation effort should focus on areas where *S. leytensis* is present by providing long term protection of current wild populations and their habitats. Policy statement on captive breeding available from IUCN recommends captive-breeding actions when field surveys demonstrate that populations have fallen below 1,000 individuals in the wild. At the present time, comprehensive surveys are needed to assess the number of individuals remaining in the wild.

Table 2. Effectiveness of Conservation Measures: High scores indicate that specific conservation measure is considered to be effective. Scores were determined using a 5 point scale (1 being not effective, 5 being fully effective).

Conservation Measures Effectiveness (from the highest to the lowest)

	Score
Education of local people and authorities	5
Enforcement of existing laws regarding the Philippine Forest Turtle	5
Anti-collecting patrols in selected sites	5
Sustainable alternative incomes to local communities	5
Monitoring and research on the Philippine Forest Turtle	4
New/upgraded protected area	4
Monitoring of trade	3
Habitat restoration and enhancement	3
Captive breeding facility	2
Reintroduction of Philippine Forest Turtle	1

6.0 Quality Control

Quality and rigorous data were considered as an important part of our project. We were also aware of the past conservation projects that failed to verify their data collection. Our field crew did not collect signatures from the official representatives as a proof that they visited the area. Indeed, most officials usually knew very little about turtles and their locations were often far from suitable aquatic habitats. Further, signatures can just be collected from local officials (e.g., barangays) without really conducting in depth interviews especially in remote areas that require additional time and effort. For our project, we required that all our team members gathered and saved GIS points of all the data collected. The team conducted often meetings to ensure good quality of work and results (Photos 21-22). Then, an independent auditor conducted random visits during and after field surveys using GPS points saved on the GPS units to verify the authenticity of the data collection.

7.0 Safety

It was our projects' policy to provide and maintain a safe and healthful environment and to take steps necessary to prevent injury to being in the field. We considered ourselves the most important asset; therefore, prevention of injuries and illnesses was given precedence over other considerations. Prior to the start of our field activities, we prepared a comprehensive Health and Safety Plan that included local safety issues. Members of the team including local guides strictly followed the plan while in the field. One of the members is a volunteer of the Philippine National Red Cross in Palawan and he helped us to refine the safety plan accordingly.

During field activities, we encountered few safety problems. Weather conditions during July and August 2007 were ruff due to heavy and continuous rains. Roads and trails were very muddy and made some of our surveys difficult and in few cases impossible. On July 2007, despite all preventive measures taken, two team members became infected by malaria. We then stopped surveying the area due to high risk of transmission. Happily, our two team member quickly recovered. Finally, we stopped temporally our field activities during June 2007 due to elections. Violence during election is well-documented in the Philippines and it is not advisable to be in the field at that time especially in remote areas where many surveys usually occurred.

8.0 Conclusions and Recommendations

Despite supporting the highest percentage of remaining forest cover in all of the Philippines, illegal logging, illegal hunting and collecting of wildlife, water contamination, and regular burning seriously threaten the biodiversity of Palawan. Furthermore, the protected area system is weak, enforcement of the existing law inadequate and inexistent, and environmental awareness insufficient. We acknowledge that good science is necessary but not sufficient to conservation.

The ongoing level of trade domestically and internationally highlights the failure of past and current activities to reduce illegal trade, in particular at the domestic level.

Based on all past and current projects conducted on the Philippine Forest Turtle in Palawan, we strongly recommend the followings:

- Long-term ecological studies including monitoring should be supported: while they are often a significant draw on resources, these studies provide critical insights into the variation, flexibility, and resilience of turtle populations. Furthermore, they are one of the few ways that we can actually monitor, and evaluate, the direct impact of our conservation actions. We are sorely lacking any real data of habitat use, populations, reproduction, and survival of the Philippine Forest Turtle in the wild.
- Create a GIS map of all the known *S. leytensis* sites and delineate critical habitats. This will demand collaboration between individuals and data sharing amongst all people involved in the study and conservation of this species.
- Critical habitat essential to the survival of the Philippine Forest Turtle must be designated and conservation effort be implemented on those areas including associated benefits to local communities. Sustainable economic activities for those protecting the Philippine Forest Turtle and its habitat must be developed.
- Future projects should be conducted in conjunction with other parties and integrate other people experience.
- Known local illegal traders in Palawan should be targeted. Some have been known for a while now, but no legal actions have yet been undertaken by local authorities or other local concerned organizations. This “silent mode” should be “turns off”, and immediate actions should be pursued in this area.
- Past and current interdisciplinary battles should be stopped. Common language and ground must be created. Conservation organizations, small and large, must stop competing and join forces to save the critically endangered Philippine Forest Turtle. We need to develop active partnerships at all levels between all concerned parties to work together to close down the trade as recommended by Fidenci and Maran (2009).
- Experience and information sharing amongst biologists and conservationists should be encouraged. Too often, as we sadly experienced in Palawan, biologists did not share any information and put personal interests above science and conservation. We propose the creation of a two-day symposium on the Philippine Forest Turtle at Puerto Princesa City, Palawan. Research papers can be presented, information and experience shared, new comers invited and encouraged and concerns, ideas and projects developed.

-
- Awareness effort of the illegal trade and status of the Philippine Forest Turtle within the range of the species should be continued and intensified.

As a practical example to protect the Philippine Forest Turtle, we propose to select few critical sites where locals will be conducting ongoing monitoring surveys with the support of an experienced biologist. Illegal turtle poachers should be hired and turned into field technicians who will be conducting surveys and monitoring to protect turtles. Conservation efforts and achievements should be rewarded to the local community and individuals.

Monitoring is vital both for detecting declines and measuring recoveries subsequent to discoveries of new localities of the Philippine Forest Turtle. It also provides data on life history that is essential in proposing effective management strategies. Therefore, we recommend a self-sustained monitoring scheme that relies on sustain funds (e.g., endowment fund). Temporary field studies are a good start, however, biologists and conservationists must find innovative ways to have long-term funded monitoring program that will provide suitable protection against illegal poachers and other illegal activities.

Monitoring program cannot be based only on abundance. Apparently healthy population of turtles may in fact already be imperiled because of long term chronic reproductive failure. Thus, in addition to abundance, reproductive rates and age structure must be monitored. To implement a monitoring program that uses affordable and reasonable resources, we must develop solutions that involve and benefit local communities.

Furthermore, there is a need for intensified conservation awareness as evident in a recent incident in Dumarán Island wherein a section of major creek (Omoi Creek) inhabited by the Philippine Forest Turtle was illegally filled in by local residents in 2008.

Conservation of the Philippine Forest Turtle will help conserve ecosystems and landscapes that provide human population with essential ecological services to ensure necessities such as food and water, flow control, and for maintaining a high-quality environment for health and economic reasons; it is not just the Philippine Forest Turtle, but people who live in the area of the turtle. We must encourage and develop sustainable economic activities for those who are living within the range of the Philippine Forest Turtle.

9.0 Literature Cited

- Berlin, B., Breedlove, D.E., and Raven, P.H. 1966. Folk taxonomies and biological classifications. *Science* 154:273-275.
- CITES. 2002. CITES Appendices I, II and III. [Http://www.cites.org](http://www.cites.org).
- Conservation International. 2003. Press releases, May 15 2003. http://www.conservation.org/xp/news/press_releases/051503.xml.
- Das, I. 1996. Status of knowledge of the biology and conservation of non-marine turtles of the Philippines. Inter. Cong. Chelonian Conservation, Gonfaron (France). 1995, 81-83 pp.
- De Elera, C. 1895. Cata ́logo sistema ́tico de toda la fauna de Filipinas conocida hasta el presente, y a la vez et de la collection zoological des Museo de PP Dominicos del Colegio- Universidad de Santo Tomas de Manila. Vertebrados I. Manila: Santo Tomas College, 701 pp.
- Declining Amphibian Populations Task Force (DAPTF). 1998. The DAPTF Code of Practice.
- Diesmos, A. C., Gee, G.V.A., Diesmos, M.L., Brown, R.M., Widmann, P.J., & Dimalibot, J.C. 2004a. Rediscovery of the Philippine Forest Turtle, *Heosemys leytensis* (Chelonia: Bataguridae), from Palawan Island, Philippines. *Asiatic Herpetological Research* 10: 22-27.
- Diesmos, A. and Palomar, N. 2004b. The status of biological diversity in the Palawan Corridor. In: Anda, R.D. and Tabangay-Baldera, J.G. (Eds.). Surublien: Strategies to Conserve Palawan's Biodiversity. Puerto Princesa City: Provincial Government of Palawan, Palawan Council for Sustainable Development Staff, Department of Environment and Natural Resources, Palawan NGO Network, Inc., and Conservation International Philippines, pp. 1-7.
- Diesmos, A.C, Brown, R.M, Alcala A.C, and Sison R.V. 2008. Status and Distribution of Nonmarine Turtles of the Philippines. *Chelonian Conservation and Biology* 7(2):157-177.
- Fidenci, P. 2004. Discovery of a wild population of the critically endangered Philippine Forest Turtle, *Heosemys leytensis*, in Palawan, Philippines. *Turtle and Tortoise Newsletter*.8:1-2.
- Fidenci, P. 2005a. Geographic distribution: *Dogania subplana* (Malayan softshell turtle). *Herpetological Review* 36:465.
- Fidenci, P. 2005b. A new technique for capturing pacific pond turtle (*Actinemys marmorata*) and a comparison with traditional trapping methods. *Herpetological Review*. 36(3):266-267.
- Fidenci, P. 2007. La tr ́s rare tortue des Philippines, *Heosemys leytensis*. *La Tortue*. 76: 50-63.
- Fidenci, P. and Maran, J. 2009. Illegal domestic trade of the Philippine forest turtle (*Siebenrockiella leytensis*) in the Philippines. *TurtleLog* No. 3, doi:10.3854/tln.003.2009, http://www.iucn-tftsg.org/turtlelog_online_newsletter/tln003/.
- Gaulke, M. and Fritz, U. 1998. Distribution patterns of batagurid turtles in the Philippines. *Herpetozoa* 11(1/2):3-12.
- IUCN. 2009. The 2009 IUCN Red List of Threatened Species. Gland:IUCN. <http://www.redlist.org>

-
- Ives, I.E, Platt S.G, Tasirin J.S, Hunowu, Siwu S, T.R. Rainwater. 2008. Field surveys, natural history observations, and comments on the exploitation and conservation of *Indotestudo forstenii*, *Leucocephalon yuwonoi*, and *Cuora amboinensis* in Sulawesi, Indonesia. *Chelonian Conservation and Biology* 7(2):240-248.
- Iverson, J. B. 1992. A revised checklist with distribution maps of the turtles of the world. Richmond, Indiana (privately printed), xiii 363 pp.
- Kuchling, G., Tint, Lwin, and Sein Aung, Min. 2006. Interview based surveys on exploitation and status of endemic river turtles in upper Myanmar and implications for their conservation. Proceedings 2nd International Congress on Chelonian Conservation 18 to 22 June 2003. Senegal. *Chelonii* 4:254-261.
- Matillano J. D. 2008. Status and Dynamics of Trade of *Heosemys leytensis*. CEPF Small Grant Final Project Completion Report.
- PCSDS. 2005, *The State of the Environment 2004, Province of Palawan, Philippines*. Palawan Council for Sustainable Development, Puerto Princesa City, Philippines
- Quinnell, R. and Balmford, A. 1988. A future for Palawan's forests? *Oryx* 22 (1): 30-35.
- Siebenrock, F. 1903. Schildkröten des östlichen hinterindien: Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften zu Wien 112:333–352.
- Taylor, E. H. 1920. Philippine turtles. *Philippine J. Science* 16:130-133.
- Taylor, E. H. 1944. Present location of certain herpetological and other type specimens. *Univ. Kansas Sci. Bull.* 30, Pt.1. 11:160.
- Timmerman. W.W. and D.L. Auth. 1988. Geographic distribution. *Herpetological Review* 19 (1): 21.

10.0 Budget

Project Preparation

Administrative

Total (permit application, meetings, forms, photocopies, others): \$790

Scientific equipments:

Two laptop computers, memory cards, extra batteries: 2100

GPS units: 330

One mobile GIS unit (Ipak): 1800

Calipers and turtle marking tools: 280

Water and air thermometers: 100

Digital cameras, flash, batteries: 1772

Rain bags protection 78

Flashlights 410

Traps: 380

Radios: 301

Others: 298

Total: \$ 7849

Project implementation

Food, lodging and stipends

\$6700 (field surveys and activities up to 12 people, storage equipment)

Local guides

\$1060 (field surveys)

Education and trainings

\$2780 (materials, school visits, media outreach, room rental, GIS training)

Communications

\$1510 (phones for field activities, internet)

Total: \$12050

Field logistics

Tents: 130

Bag packs: 210

Field hammocks: 240

First aid equipment, tablets of Natrium Dichlorisocyanurate, mosquito repellents, mosquito nets, malaria pills, rubber boots: 520

Phone cards: 440

Total: \$ 1540

Transportation and travel for field activities

Van and motorcycle rentals, bus, motorcycle repairs and use: 3500

Air fare: 617

Total: \$ 4117

Post project Expenses

Administration: 155

Report production and results dissemination: 687

Total: \$ 842

Grand Total: \$ 27188

11.0 Acknowledgments

This project was conducted in partnership with Palawan State University (PSU). PSU provided as counterpart faculty members, venue for GIS and turtle training, room for meetings, storage for equipment, and assistance in selecting students.

We thank the following organizations:

- British Chelonia Group (BCG)
- Carapax European Center of turtles and tortoises.
- Conservation Leadership Programme (formerly Bp Conservation Programme)
- Conservation International (CI)
- Endangered Species International (ESI)
- Turtle Conservation Fund (TCF)
- Turtle Survival Alliance (TSA)
- Sophie Danforth Conservation Biology Fund
- The Future for Wildlife program
- Soptom, France
- Fauna and Flora International
- Turtle Conservation Fund (TCF)
- Palawan Council for Sustainable Development Staff (PCSDS)
- Palawan State University (PSU)
 - Center for Strategic Policy and Governance
 - PSU Center for Strategic Policy and Governance, Inc
 - Biodiversity Center for Research and Conservation
 - College of Sciences
- The Municipalities of Narra, S. Española, Brooke's Point, Quezon, Bataraza, Rizal and Balabac

We are also very grateful to the following individuals:

Dr. Teresita L. Salva (PSU), Dr. Michael D. Pido (PSU), Dr. Lorna C. Gelito (PSU), Reymar R. Castillo (PSU/ESI), Elmer G. Gadot (PSU/ESI), Clemencio Pena (PSU and former Director of the Biodiversity Center), Joseph Jefferson T. Dancil (ESI), Allan R. Artajo (PSU/ESI), Joey S. Heredero (PSU/ESI), Benigno R. Dormile, Earl H. Timbancaya (PSU/ESI), Ronel F. Daganta (PSU/ESI), Renan P. Badajos (ESI), Noli O. Linga (ESI) and Cristopher C. Gorobao (ESI), Peter Paul Van Dijk (CI), Jaynee Tabangay (CI), Anders Rhodin (Chelonian Research Foundation), Rick Hudson (TSA), John Pontillas (PCSD), Maria Rosefa Lanuzo (ESI), Andreas Rytz (ESI), Eunkyung Chae (ESI), Marianne Carter (Conservation Leadership Programme), Kate Stokes (Conservation Leadership Programme), Robyn Dalzen (Conservation Leadership Programme), Lynn Duda (Wildlife Conservation Society), Arvin C. Diesmos (National Museum of the Philippines), Bernard Devaux (Soptom), Chris Giorni (Tree Frog Treks), the Palaw'ans, Tagbanuas, and Molbogs.

Appendix A

Photographs



Photo 1. Team members during night survey training.



Photo 2. GIS training conducted prior to field surveys.



Photo 3. Team member exploring remote areas of Southern Palawan, which have never been surveyed before.



Photo 4. Our team searching under banks for hiding turtles during daytime.



Photo 5. Our team showing results of our surveys to local communities.



Photo 6. Identification cards were distributed to local communities to strengthen the search of the Philippine forest turtle in the wild.



Photo 7. Turtles often hide under banks of creeks.



Photo 8. Potential aquatic habitat for the Philippine Forest Turtle in Balabac Island, Southern Palawan.



Photo 9. Comparisons of carapaces of turtle species.



Photo 10. The Malayan Softshell Turtle *Dogania subplana* observed in southern Palawan.



Photo 11. The Philippine forest turtle.



Photo 12. Philippine forest turtle adult.



Photo 13. The Asian leaf turtle *Cyclemys dentata* observed in southern Palawan. The Asian leaf turtle was commonly observed in southern Palawan during night surveys.



Photo 14. Malaysian box turtles *Cuora amboinensis* observed in the field in Southern Palawan.



Photo 15. Philippine forest turtles sold illegally in pet stores in Manila.



Photo 16. Poster and calendars were distributed at various locations throughout Palawan.



Photo 17. Interviews and conservation awareness conducted during market events.



Photo 18. Presentation on the Philippine forest turtle to locals.



Photo 19. Conservation awareness conducted in school.



Photo 20. Puzzles on the Philippine Forest Turtle were distributed to local communities



Photo 21. Meetings prior and after field surveys were organized to share ongoing results and experience.



Photo 22. From left to right members of the field team: Earl Timbancaya, Ronel Daganta, Elmer Gadot, Rei Castillo, Jong Dancil, Allan Artajo, Noli Linga, Noy Dormile, Reynan Badajos , Joey Heredero and Cris Gorobao